2002

Web-based distance instructional partnership for maritime technology of Pacific Rim countries

Chun-mei Shieh
University of Northern Iowa

WEB-BASED DISTANCE INSTRUCTIONAL PARTNERSHIP FOR MARITIME TECHNOLOGY OF PACIFIC RIM COUNTRIES

A Dissertation

Submitted

in Partial Fulfillment

of the requirements for the Degree

Doctor of Industrial Technology

Approved:

Dr. John T. Fecik, Advisor

Dr. Lesta A. Burgess, Co-Advisor

Dr. Ali E. Kashef, Committee Member

Dr. Sharon E. Smaldino, Committee Member

Dr. Joyce Zhuojun Chen, Committee Member

Chun-mei Shieh

University of Northern Iowa

December 2002

ProQuest Information and Learning Company
300 North Zeeb Road
P.O. Box 1346
Ann Arbor, MI 48106-1346

WEB-BASED DISTANCE INSTRUCTIONAL PARTNERSHIP FOR MARITIME TECHNOLOGY OF PACIFIC RIM COUNTRIES

An Abstract of a Dissertation

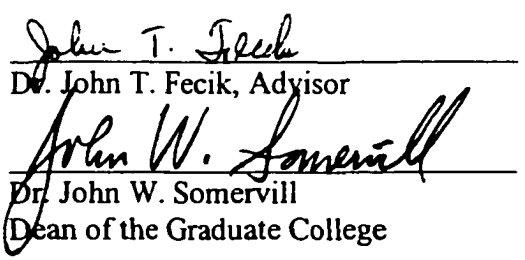
Submitted

in Partial Fulfillment

of the Requirement for the Degree

Doctor of Industrial Technology

Approved:



Dr. John T. Fecik, Advisor

Dr. John W. Somervill
Dean of the Graduate College

Chun-mei Shieh

University of Northern Iowa

December 2002

ABSTRACT

The prime purpose of this study was to identify and determine the attitudes and intentions of the faculty members in the field of marine technology education in Taiwan and Australia regarding adopting Web-based distance education. A secondary purpose was to develop guidelines for a program in preparation for implementing Web-based distance education for faculty members in Taiwan.

Five groups in the field of marine technology composed the research population for this study. They are the faculty members in Taiwan in nine vocational high schools, two junior colleges, the National Kaohsiung Institute Marine Technology (NKIMT), and the National Taiwan Ocean University (NTOU) and the faculty members in Australia in the Australian Maritime College (AMC).

The survey instrument was developed through the literature review, with reference to studies done before, the researcher's course study, and expert validations of the questionnaire. The questionnaire was comprised of six independent variables. They were (a) instructors' perspectives on educational technology, (b) attitudes regarding Web-based distance education, (c) perceptions of Web-based international education, (d) skills with computers, the Internet, the World Wide Web (WWW), and Web Course Management (WCM) tools related to design, development, and delivery of Web-based courses, (e) technology training programs for faculty members to develop Web-based courses, and (f) demographic information.

Data were analyzed using three statistical tests and the level of significance was set at .05. One-way ANOVA was used to detect the existence of differences in perceptions of Web-based education, both domestically and internationally, among the five groups. Pearson's correlation was employed to investigate if significant

correlations existed among these variables. A two-sample Kolmogorov-Smirnov test was used to determine if consistent results existed among these groups. When conducting a training program, the consistencies and the individual group differences need to be considered.

The results of the study indicated that the faculty members in the field of marine technology showed intentions and interests in taking advantages of Web technology to deliver courses. Certain variables were related and there was no inconsistency existing among the groups.

DEDICATION

This work is dedicated

in gratitude

To my parents, An Nan Shieh and Shu Lan Chen,

for the cherished values they instilled in me.

To my husband, Suey-yueh Paul Hu,

for his understanding, encouragement, support, and love

To my daughter, Angela Hu,

for she is our source of happiness.

ACKNOWLEDGEMENTS

I would like to thank those whose support was essential for me to complete this dissertation. I am very grateful to my advisor, Dr. John T. Fecik, who worked diligently with me and offered guidance throughout the long process. Appreciation and thanks are extended to the committee members, Dr. Lesta A. Burgess, Dr. Ali E. Kashef, Dr. Sharon Smaldino, and Dr. Joyce Zhuojun Chen for their assistance and advice. The course study from Dr. Burgess on multimedia techniques on the Web and Dr. Smaldino on distance education was a foundation for this research.

Special thanks go to Dr. Kirk Wu and Dr. Suey-yueh Paul Hu from the National Kaohsiung Institute Marine Technology (NKIMT) for their instruction in the Chinese version of the questionnaire, to Dr. Chungyaw Ching from the University of Shih Hsin and Dr. Wen-Kai Hsu from the University of Shu Te for their guidance in statistical analyses, and to Ms. Jana Nelson for proofreading this dissertation. In addition, I wish to express my appreciation for the assistance from NKIMT, Department of Marine Engineering and Merchant Ship Seafarer Training Center in conducting this research.

Finally, I would like to thank my parents, my husband, and my siblings for their support and for taking care of my little girl while I was away from home to pursue my academic career.

TABLE OF CONTENTS

PAGE

PAGE

LIST OF TABLES

TABLE PAGE

CHAPTER I

INTRODUCTION

Background

Technology, from a definition by Wright, Israel, and Lauda (1996), is "a body of knowledge and actions used in applying resources, developing, producing, and using artifacts and systems, extending the human potential and controlling and modifying the natural and human-made environments" (p. 9). Thus, not only is technology a driving force in human society, but it also has a great impact on the quality of life. The history of human beings is a history of technology revolution (Kranzberg, 1997). So far, man has gone through several important revolutions, such as the agricultural revolution, industrial revolution, and information revolution. Every revolution has changed the structure of society and thus has the potential of leading humans to a much better, more comfortable, and more convenient way of life. Right now the Internet revolution is progressing toward a situation that no one can exactly predict in advance. However, almost every aspect of human life is feeling its impact (I. C. Young, 1999). Above all, the influence of Internet technology on teaching and learning is becoming more and more evident in educational institutions around the world. Higher education in the 21st century will be radically restructured; online learning will constitute 50% of all learning (Boettcher, 1999; Chute, Thompson, & Hancock, 1999; Draves, 2000; Manicas, 1998; Skolnik 1998).

Technological advancement of the past several decades in information technologies has contributed to the development of the Internet and its most popular application, the World Wide Web (WWW). The Internet is a collection of local, regional, and national computer networks that are linked together to exchange data

and distribute processing tasks (Comer, 1999; Sharda, 1999). In 1993, the United States government started the National Information Infrastructure (NII). NII enhanced the development of distance learning and teaching.

Online learning presents a paradigm shift in distance education (Manicas, 1998; Moore & Kearsley, 1996). Web-based instruction has emerged based on computer networking. According to a document from the U.S. Department of Education, National Center for Education Statistics (1999), almost 80% of the public four-year institutions and more than 60% of the public two-year institutions offered distance education courses. There were 1,661,100 students enrolled in distance education courses offered by U.S. higher education institutions. Asynchronous Internet instruction (58%), two-way interactive video (54%), and one-way prerecorded video (47%) were the most popular technologies used to deliver courses. In the future, Internet technology will be an important option for faculty to deliver courses to learners at a distance (Grown, 2000).

Taiwan, according to a report from the Institute for Information Industry (2001), is in 8th place in the World for numbers of network servers. The first seven in order are the United States, Japan, Canada, Britain, Germany, Italy, and Australia. In Asia, Taiwan is in second place behind Japan. After the government launched a four-year NII plan of its own in 1997, the number of Internet users is growing. However, the application of Web-based teaching and learning in educational institutions is still, compared to the United States, in its infant stage. Due to social and cultural factors such as teacher-centered learning and teaching, rigorous examinations, and great respect for scholarship, people of Chinese culture are skeptical of the quality of distance education; thus, the application of Internet networking in conducting courses

has not yet been widely accepted in various disciplines (editorial, 1999; editorial, 2000; Sherritt, 1999).

The field of maritime technology is an example. Maritime technology is a discipline including navigation and maritime engineering, satellite navigation systems, and wireless communication (T. S. Chen, 2000; Liao, Liu, & C. K. Wu, 2000). In Taiwan, because of the needs arising from sharing and exchanging information regarding maritime technology and obtaining certificates from other countries which are members of the International Maritime Organization (IMO), online learning has been a solution. Not only does it break the limitations of time and space, but also it greatly increases the interaction between faculty and students of universities in different countries (S. Y. Hu, personal communication, July 14, 2000). Also, the development of international collaboration in distance education has become an important topic (Moore, 1994; Romeu, 2000).

Boettcher and Conrad (1999), Lau (2000), Moore (2000), and Simonson, Smaldino, Albright, and Zvacek (2000) stated that, due to the adoption and support of distance teaching and learning, there could be a great many policy issues to be dealt with. For instance, there are issues concerning copyright and intellectual property rights, accreditation and quality assurance, and changes and challenges facing the role of faculty. The question is how educators are going to face this "technology-driven change: Where does it leave the faculty?" (Moore, 2000a, p. 1).

Moore (2000) points out that in spite of the fact that technological development has been able to facilitate learning and teaching online, knowledge of how to make good use of this modern technology is still far behind because "Educators, both in the classroom and in administration, are unable or unwilling to make the necessary

organizational and structural changes in their institutions to take best advantage of the technology" (p. i). To answer the question of why educators have been unable or unwilling to incorporate Internet technology into their institutions, an attitude survey is a way to find out the truth and to invite the faculty to participate in and decide how new policies are going to be implemented (Heath, 1999; Moore, 2000b).

Attitude has been defined as a positive or negative affect toward a social object, situation, or value (Ary, Jacobs, & Razavieh 2000). Schuman and Presser (1996) defined attitudes as "opinions, beliefs, values, preferences, and so on" (p. 2). Rogers (1995) developed diffusion adoption theory to illustrate how innovations come to be widely adopted. In relation to an innovation, newness does not mean new knowledge but an idea, practice, or object about which persons have not yet developed favorable or unfavorable attitudes and opinions, nor adopted or rejected it. Thus, attitudes help people understand the world around them, protect their self-esteem, adjust to a complex world so that they will do the right things at the right time, and express their fundamental values. In other words, the function of attitudes are understanding, need satisfaction, ego defense, and value expression (Katz, 1960).

Technology in education is an innovation that impacts education; therefore, it is valuable to assess educators' attitudes pertaining to this in order to understand how faculty members will react using Web-based instruction technologies. Attitudes also affect the subsequent degree and rate of adoption. Furthermore, an understanding of their perceptions regarding these technologies has an influence on how effectively they are used to deliver courses (Howie & Wen, 1997; Ndahi, 1999).

In conclusion, the main theme of this research was to investigate maritime technology faculty members' attitudes toward Web-based instruction and obtaining

certificates and degrees via international education programs. If human society is a history of inventing and applying various technologies to improve the quality of life, then, the Internet, the great facilitator of globalization, with its power in delivering information and communicating messages, undoubtedly, is another milestone in the information technology revolution. The world is changing due to the advance of technology. Humans are facing a new educational paradigm for the new millennium (Manicas, 1998).

Statement of the Problem

The problem to be investigated in this study was to establish faculty attitudes regarding a distance education instructional program for maritime technology institutions in two seafaring countries. A secondary problem was to examine the readiness for offering certificates to seafarers via international education with countries who are members of the United Nations.

Statement of Purpose

The prime purpose of this study was to identify and determine faculty attitudes and intentions about adopting distance educational methodology. A secondary purpose was to develop guidelines for a program in preparation for implementing Web-based distance education for the faculty members in Taiwan.

Statement of Need

The incentive for this study came from an international distance education program which is in the process of being implemented between the Australian Maritime College (AMC) and the National Kaohsiung Institute Marine Technology, Taiwan (NKIMT). These two maritime colleges are planning to conduct a joint masters degree distance education program (C. K. Wu, 2000).

Taiwan Institutional Needs

Taiwan is an island that needs to develop marine technology in order to be able to conduct commerce with other countries via the ocean. Currently, educational institutions that teach vocational maritime technology include two universities, two junior colleges, and nine vocational high schools. Compared to other disciplines, the faculty and students are not great in number. However, this special discipline is fundamental to Taiwan's economic growth and prosperity (M. S. Young, 2000). Recently, due to the impact from the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW), and the declining student population in Taiwan, the vocational maritime technology educational system is facing a great challenge to reform its curriculum to incorporate the standards of STCW and to readjust and reorganize its structure. In addition, for those who are already serving in the field, there is a need to have an avenue for continuous learning and training in order to be able to cope with new technologies in the maritime area. The providers and coordinators for maritime education and training are the two universities, NKIMT, and National Taiwan Ocean University (NTOU), which are in a position to take the lead in applying new information technology in teaching and learning (S. Y. Hu, personal communication, July 14, 2000; C. K. Wu, 2000).

The STCW is an international convention first drafted in 1978 by the International Maritime Organization (IMO), which is the United Nations' agency responsible for improving navigation safety and preventing pollution from ships around the world (Ian, 2000). Due to the advance of modern technology, in 1995, based on the old version of STCW78, a new version was drafted and passed to regulate the management and operation of ships with complicated equipment. Every

country has had to implement the new version of STCW95 by February 2002 to facilitate safe sailing on the public oceans (Implementing STCW95). According to T. S. Chen (2000), of all the vocational education in the world, the qualification of seamen, marine engineers, and operators of wireless communication was the earliest regulation set by international convention for the sake of public safety.

In Taiwan in order to comply with the new version of STCW95, efforts have been made to revise the relevant laws, decrees, orders, regulations, and curriculum design (T. S. Chen, 2000). However, obtaining certificates for seafarers in Taiwan has become an issue because "Certificates issued by or under the authority of a NON-PARTY shall not be recognized"(IMO White List). Taiwan is neither a member of the United Nations nor a member of IMO. Thus, "a theory of third channel" was introduced by Ian (2000, p. 4). The theory, according to Ian (2000), means that although non-member countries cannot issue seafarers' certificates, they can be assisted by IMO members to obtain certificates.

Training Program Needs

Due to the above fact, establishing international education programs or conducting training programs with members of IMO by Internet technology in order to obtain certificates becomes an option (S. Y. Hu, personal communication, July 14, 2000). Thus, an investigation of the faculty's attitudes and intentions toward Web-based international education becomes important. Also, from Moore (1994) and Romeu (2000), the development of international collaboration in distance education has been receiving great attention due to the advance of information technology.

Another concern of this study is that there is a demand for skilled workers, technicians, and engineers as well as a possibility for marine technology faculty to

update information, improve techniques, learn new knowledge or develop a second professional proficiency. Setting up a Web-based course in order to solve the problems of time and space becomes a solution (C. K. Wu, 2000). Thus, it is necessary and important to survey the faculty's willingness to offer Web-based courses to learners either at a distance or locally to facilitate teaching and learning. If most of the faculty is interested in offering courses online, then what can be done to help them conduct online courses and explore more effective means of delivering the knowledge and skill of a content area to learners at a distance or locally.

Culmination of Need

There were two areas of need examined in this study. One was to explore the necessity of establishing international education programs with IMO members from the perspective of obtaining certificates for seafarers. The other was to explore the possibility of the application of Web-based teaching and learning in the whole system of marine vocational education in Taiwan. The faculty's attitudes and intentions were critical. As C. K. Wu (2000) pointed out, the convenience and advancement of information technology could be used to enforce the horizontal and vertical relationships of marine vocational educational institutions. A horizontal relationship is between university and university, college and college, vocational high schools and vocational high schools, and students and students. A vertical relationship is the connection of vocational high schools to colleges and to universities and the connection of the faculty to the students. All of these schools will interact and cooperate with one another in curriculum design, practicum courses, and courses delivered by modern information technology.

Research Questions

The following research questions were used in this study:

1. What are similarities and/or differences in attitudes and intentions regarding Web-based distance education and Web-based international education programs among the faculty at nine vocational high schools, two junior colleges, the two universities in Taiwan, and the faculty at AMC in Australia?

2. What is the relationship between perspectives on educational technology and Web-based distance education?

3. What is the relationship between perspectives on educational technology and Web-based international education programs?

4. What is the relationship between the Web-based international education programs and the Web-based distance education?

5. What is the relationship between the faculty's skills with computers, WWW, and WCM tools and Web-based international education programs?

6. What is the relationship between age and Web-based distance education?

Assumptions

The following assumptions were made in pursuit of this study:

1. The respondents to the questionnaires would provide honest and sincere answers.

2. The respondents were capable of understanding all statements in the questionnaires.

3. The necessary translation preserved the validity of the statements in this study.

4. There would be no misunderstanding of meanings in the language translations.

5. Comparatively, the motivation of the faculty of the two universities, NKIMT and NTOU in Taiwan would have the stronger motivation to provide Web-based international programs than that of AMC because of the need to obtain certificates for seafarers.

6. Comparatively, NKIMT would have the stronger motivation to provide Web-based international education programs than NTOU because NKIMT is a younger university.

7. Comparatively, the faculty in the two universities would have the stronger motivation to offer Web-based courses than the faculty in colleges and vocational high schools.

8. It is assumed that if a faculty member gets a high score in perspectives on educational technology, he or she is more willing to offer courses online.

9. It is assumed that the younger the faculty members are, the more likely they apply the Web-based teaching and learning technologies.

Limitations

The study was conducted with the following limitations:

1. The selected population was restricted to the maritime technology faculty members in the thirteen educational institutions in Taiwan which consists of nine vocational high schools, two junior colleges, and two universities and the faculty at AMC in Australia.

2. Full time faculty were selected because they are willing to identify their needs in the area of instruction and in understanding the importance of applying this new technology in higher education.

3. The results and conclusions may not be generalized to other educational institutions.

4. The results of this survey would be accurate only to a point in time and may not be relevant as new technology arrives in the future.

5. The selected variables in this study were restricted to attitudes with respect to Web-based distance education, Web-based international education programs, the perception of technology, skill with computers, WWW and WCM tools, and demographic information.

6. The procedure of grouping dimensions was accomplished according to the similarity in nature.

Statement of Procedure

This section is composed of two parts. The first part, research design, includes the description of the population and sample, the development of the research instrument, the instrument validation and pilot test, data collection, and data analysis. The second part is research procedure.

Research Design

Based on the purpose and research questions of this study, the type of research used was a combination of survey and correlational research. Survey, according to Fraenkel and Wallen (2000) is one of the most common forms of research to investigate the target population's opinions. Dominowski (1980) stated, "Studying relations between variables is the hallmark of scientific work because understanding how variables are related to one another is the core of scientific understanding" (p. 241).

The idea of the design for this research was derived from Ary et al. (2000), Gay and Airasian, (2000), and Fraenkel and Wallen (2000) and is stated as follows. First, the researcher identified the variables of interest and asked questions about the relationship between them. The variables selected for the study were based on previous research (Betts, 1998; Clay, 1998; Heath, 1999; Murphy & Terry, 1995; Nasser & Abouchedid, 2000; Perdue & Valentine, 1998; Rockwell, Schauer, Fritz, & Marx, 1999) and on the researcher's observations and understanding of maritime technology in Taiwan. Meanwhile, the population of interest was also specified. Next, the operational definition of terms was defined by reviewing relevant literature. Then a self-completion questionnaire form was used to collect data. Finally, statistics were employed to organize, summarize, and interpret the data collected, and the coefficient of correlation among scores was calculated.

The dependent variables were derived from each research question. The quasi-independent variables were perspectives on educational technology, attitudes regarding Web-based distance education, perceptions of Web-based international distance instruction programs, skills with computers, WWW, and WCM tools related to design, development, and delivery of Web-based courses, and demographic information.

Description of the Population and Sample

The population of maritime technology faculty examined in this study consisted of five groups. Group one was the faculty in nine vocational high schools (n = 186). Group two was the faculty in two junior colleges (n = 56). Group three was the faculty in NKIMT (n = 67). Group four was the faculty in NTOU (n = 42). Group five was the faculty in AMC (n = 25). In total, there were 376 faculty members. The

source for the list of faculty members was extracted from the Web page of the Ministry of Education in Taiwan (http://www.edu.tw) and the Web-page of AMC (http://www.amc.au). All samples in Taiwan were included in this study as there are only 13 maritime technology institutions. In Australia, only samples from AMC were used because AMC and NKIMT are planning to conduct a joint masters program.

The Development of the Research Instrument

Components of the questionnaire came from three sources. One was selected and adapted from previous research instruments (Navarro & Shoemaker, 2000; Perdue & Valentine, 2000; Peterson, 1999; Sullivan, 1999; Tseng, 1995). Another was developed from the researcher's course study and the experience of using a WCM tool, WebCT. The other was input and suggestions from experts in relevant fields, such as communication technology and distance education, and comments from the faculty of NIKMT and AMC. The questionnaire was structured to derive data related to the research questions.

The questionnaire consists of 6 parts. In each part there are 10 statements. Part I was formulated to evaluate the faculty's perspectives on educational technology. Part II was designed to investigate the faculty's attitudes regarding Web-based distance programs conducted domestically. Part III was produced to understand the faculty members' perceptions of Web-based international education programs. Part IV was created to assess the faculty members' skills with computers, WWW, and WCM tools related to design, development, and delivery of Web-based courses. Part V was related to setting up training programs for the maritime technology faculty regarding how to deliver courses online. Part VI was fashioned to generate demographic

information. A Likert scale with five alternative choices was used in which faculty members could circle the number that best describes their thoughts and opinions. The scale used was 1 (strongly disagree), 2 (disagree), 3 (undecided), 4 (agree), and 5 (strongly agree).

In addition to the questionnaire, a cover letter was written to invite participants to take part in the study. A request form was designed for those who wanted a copy of the results of this study. A separate comment sheet was used to collect additional responses from the respondents regarding the questionnaire. Also, for the respondents to refer to, definition and explanation of terms were listed above the beginning of each part.

After the questionnaire was developed, it was submitted to the dissertation advisory committee for review and recommendations. The approved instrument was then translated into Chinese. The research involved human subjects; therefore, authorization had to be obtained from the Human Subjects Review Board of Graduate College of the University of Northern Iowa (UNI) before the survey was conducted (see Appendix A). Appendix B shows the correspondence between questionnaire items and research questions respectively.

Instrument Validation and Pilot Testing

The quality of the instruments used in research is significant in that "the conclusions researchers draw are based on the information they obtain using these instruments" (Fraenkel & Wallen, 2000, p. 169). The validity and reliability of the instrument was ensured by experts in related fields, as well as, a pilot test. The English version of the questionnaire was sent to five university faculty for validation. There are five experts. Dr. Smaldino is a professional in distance education from

UNI. Dr. Chen is an expert in communication technology from UNI. Dr. Ching is proficient in communication technology from Shih Hsin University in Taiwan. Dr. Wu and Dr. Hu are experts in maritime technology from NKIMT. They were asked to evaluate the content of the questionnaire and to comment on the clearness and appropriateness of the items.

The Chinese version of the questionnaire was verified by a group of four faculty members. Dr. Chen is a professor from the Department of Communication Studies, UNI and is proficient in both English and Chinese. Dr. Ching is a professor from the Department of Communications Management, Shih Hsin University in Taiwan. Dr. Wu and Dr. Hu are professors from the Department of Maritime Technology, NKIMT. These four faculty members were asked to give comments about the appropriateness and clarity of the Chinese content and translation accuracy.

According to Ary et al. (2000), " Before the final printing it is essential that the researcher test the instrument in order to identify ambiguities, misunderstandings, or other inadequacies" (p. 453). Before implementing the survey, a pilot test was administered to faculty members at NKIMT, NTOU, and UNI, and faculty members in the colleges and vocational high schools to increase content-related validity and reliability. A random sampling was used to select 15 participants from the above groups to complete the questionnaire. The purpose of the pilot test was to check the time it took to finish the questionnaire, to avoid ambiguity and format problems, and to clarify the items. According to the results of the pilot test group, the researcher made the necessary corrections.

Data Collection

A survey instrument was used to collect data. The final version of the English questionnaire (see Appendix C) and the Chinese questionnaire (see Appendix D) was mailed to sample faculty members in fourteen educational institutions to collect the necessary information and data. Enclosed were the items as follows: a cover letter (see Appendix E) explaining the purpose of the survey, request form (see Appendix F), the questionnaire, the additional comment sheet (see Appendix G), and a stamped self addressed envelope. There were five groups. Group 1 is nine vocational high schools. Group 2 is two junior colleges. Group 3 is NKIMT. Group 4 is NTOU. Group 5 is AMC. A coding system was applied to facilitate a good return rate. A duplicate survey was sent to the non-responding participants within two weeks to obtain a good response rate.

Data Analysis

Correlational statistical analysis is often used to present the research results of attitudes and opinions so that the amount of relationship between variables or attitude items can be interpreted efficiently (Oskamp, 1977). Thus, the data have been analyzed by using the following statistics.

1. Frequency distribution tables have been used to organize demographic information.

2. The responses to every question were processed to produce the mean score and to make a comparison among the five groups.

3. One-way ANOVA was used to compare the mean difference of dependent variables to see if there was a significant difference among the four groups. A Tukey Post Hoc test was performed to find where the differences were.

4. Pearson's product moment coefficient of correlation was used to determine the strength of the relationship among the dependent variables: positive, negative or no relation.

5. A two-sample Kolmogorov-Smirnov test was used to examine Part V of the questionnaire, Training Programs for Faculty to Deliver Courses Online, to see if there was a consistency among groups regarding items checked.

Research Procedure

The procedure followed to complete this study was divided into several stages. The stages of preparation included (a) the statement of the problem, purpose, needs, research questions, and limitation, (b) review of literature, (c) the selection of a research methodology and appropriate statistics, (d) developing a valid and reliable questionnaire, (e) instrument validation, (f) pilot testing of the questionnaire, and (g) the questionnaire revised and printed.

The stages of data collection included (a) sending out the questionnaire with the cover letter, (b) an immediate follow up by sending a duplicate copy of the original survey to the non-responding participants, and (c) receiving the questionnaire.

The stages of data analysis included (a) data analysis by using statistical computer software, SPSS, (b) the reported results, and (c) a summary, conclusion, and recommendations for further study.

Definition of Terms

The following terms were defined to clarify their usage in the context of the study:

Attitude: Attitude is operationally defined as a continuum of favorableness-unfavorableness (Ary et al., 2000), in this study of maritime technology faculty

toward Web-based distance education and international education programs. The selected variables in this study to investigate attitudes are (a) teachers' perspectives on educational technology, (b) opinions regarding Web-based distance education, (c) perceptions of international distance instruction programs, (d) skills with computers, WWW, and WCM tools related to design, development, and delivery of Web-based courses, (e) technology training for faculty to deliver courses online, and (f) demographic information.

Distance Education: Distance instruction, distance learning, and distance education are the preferred terms used to describe technology-mediated teaching and learning, in which learners and instructors are separated geographically and communication technology is used to deliver courses and materials (Moore & Kearsley, 1996). In this study, the term, distance education is used consistently.

The Internet: The Internet is a network of networks; that is, a group of connected computers that allow users to share information (Parsons & Oja, 1998).

IMO: This is an acronym for International Maritime Organization. IMO is the United Nations' agency responsible for improving maritime safety and preventing pollution from ships around the world (Ian, 2000).

Maritime Technology: Maritime technology is a discipline including navigation and maritime engineering, satellite navigation systems, and wireless communication (T. S. Chen, 2000; Liao, Liu, & C. K. Wu, 2000).

Perspectives on educational technology: This is defined as the faculty members' attitudes and their views toward educational technology with an emphasis on the craft or art of using technology to support teaching and learning (Cutshall, 1999; Peterson, 1999).

Seafarers' certificates: Seafarers' certificates are to seamen like drivers' licenses are to drivers. Without certificates, it is illegal to work on ships, according to the IMO. There are three kinds of certificates for seafarers who are in the management level: Officer certificate, Chief Officer certificate, and Captain certificate. There are also three kinds of certificates for seafarers who operate and maintain ships: Chief Engineer certificate, First Engineer certificate, and Engineer in General certificate (S. U. Young, 1998).

STCW: This is an acronym for Standards of Training, Certification and Watchkeeping for Seafarers. STCW is an international convention first drafted in 1978 by the International Maritime Organization (IMO), which is the United Nations' agency responsible for improving navigation safety and preventing pollution from ships around the world (Ian, 2000). Due to the advance of modern technology, in 1995, based on the old version of STCW78, a new version was drafted and passed to regulate the management and operation of ships with complicated equipment. Every country must have implemented the new version of STCW95 by February 2002 to facilitate safe sailing on the public oceans (Implementing STCW95).

Technology: Technology is defined as the modification of the natural environment to satisfy human needs and wants. In other words, human beings invented and innovated various tools to improve the quality of life (Standards for Technological Literacy, 2000). In this research, the focus is on educational technology.

WCM tools: Web Course Management tools are software, such as WebCT, TopClass, Blackboard, and Convene, used to conduct online courses. These tools can help faculty and support staff with the design, development, and delivery of Web-

based courses. Web-Based Instruction tools (WBI) and Web-Based Class Management tools (WCMT) are the terms used for the tools that provide a framework or template for the steps used to offer a course online (Boettcher & Conrad, 1999; Goldberg 1997; Schweizer, 1999).

Web-based distance education: Distance education has evolved through a number of different stages which includes correspondence study, radio, television and audiotapes, broadcast systems, telephone, satellite, cable, and fiber optic lines that are not computer mediated, and online learning, which is computer mediated learning and teaching (Sullivan, 1999). In this study, the term used to describe computer mediated network learning and teaching is Web-based distance education. In addition, in this study, a distinction is made between domestic and international distance learning by the terms Web-based distance education and Web-based international distance education.

Web-based international distance education programs: This is defined as the practice of teaching and learning across national borders (Burbules & Torres, 2000)

World Wide Web (WWW): A standardized way of accessing content such as text, photos, pictures, graphics, sounds, music, animation, and full-motion video on computers connected to the Internet by using Transmission Control Protocol/Internet Protocols (TCP/IP) which provides a reliable data delivery service to application programs (Keogh, 2001).

Synopsis of Chapters

This dissertation consists of five chapters. Chapter one is an introduction of the study including statement of the problem, purpose, need, research questions, assumptions, and limitations. Chapter two contains a review of related literature. The

following points are illustrated: (a) the definition/evolution of distance education, (b) theories of distance education, (c) technology-based learning theory, that is, Constructivism, (d) the technology of the Internet and World Wide Web, (e) Web-based distance education in Taiwan, (f) Web-based international education.

Chapter three is comprised of a detailed description of the correlational methodology used for the research in this study, which includes the correlational research process, internal validity in correlational research, and problems considered in interpreting correlation coefficients. Statistical methods are also included in this chapter. Chapter four consists of the research findings. The delineation of the findings of this study and the statistical analysis of results are presented in this chapter. Chapter five includes the summary, conclusion, and recommendations based on the research problem, literature review, data, and findings.

CHAPTER II

REVIEW OF LITERATURE

This section reviews current literature applicable to the study. This chapter is divided into the following sections: (a) the definition/evolution of distance education, (b) theories of distance education, (c) Web-based learning and instruction: a constructivist approach, (d) the technology of the Internet and WWW, (e) Web-based distance education in Taiwan, (f) Web-based international education, and (g) the summary of literature review

Definition/Evolution of Distance Education

The definition of distance education is, according to Holmberg (1995), a specific delivery mode for education in which instruction and learning occur in different locations and sometimes, different times. Mood (1995) gave a definition listing three generally accepted points. First, teacher and learner should be in different places. Second, there should be an organized educational institution to control the courses. Third, in order to have interaction between learner and teacher, some form of mass media should be used.

From the above definition, it can be inferred that pedagogical issues, the application of technology, and the organization of a distance education institution are involved in a statement about distance education. To understand distance education from the point of view of organization and administration, there are four levels (Mark, 1990).

1. Distance learning program. These are activities carried out in a traditional college, university, school system, or training department whose primary

responsibilities are conventional classroom teaching and learning. It usually does not have its own faculty or administrative services.

2. Distance learning unit. As compared to a distance-learning program, this level has its own faculty and administrative staff dedicated to the educational activities of the distance learners. It is part of a parent organization to provide most of the teaching for the unit and a special, separated unit in a traditional educational institution. The extension divisions of most universities belong to this level.

3. Distance learning institution. The educational activities of the institution are exclusively directed to distance education. This is the sole purpose of the institution. It has its own faculty and administrative staff. Their responsibilities are different from those at a traditional university. The British Open University is a typical example of this level.

4. Distance learning consortia. This means the cooperation of two or more distance learning institutions that share either their course design or delivery of programs, or both. The National University Teleconference Network (NUTN) is an example of such consortia.

The classification of distance education by its levels helps us to understand the structure and administration of distance education. Also, in order to understand the whole picture of distance education, Moore and Kearsley (1996) suggested that a systems approach to distance education is the best way. As airline organizations depend on a systems model, so distance education similarly relies on a like model. Specialization and integration of each subsystem is the key to the success of organizing all levels of distance learning. A systems model for distance education consists of sources, design, interaction, and learning environment.

In conclusion, as illustrated by Moore and Kearsley (1996):

> Distance education is planned learning that normally occurs in a different place from teaching and as a result requires special techniques of course design, special instructional techniques, special methods of communication by electronic and other technology, as well as special organizational and administrative arrangements. (p. 2)

The Evolution of Distance Education

The above statement is in regard to the definition of distance education. The following segment will be about the evolution of distance education. Although distance education may seem like a recent development, it is more than a century old. Correspondence education is the origin of distance education. The earliest recorded data shows that correspondence education started in Great Britain in 1728 while in the United States, it was not begun until 1891. Formal organized education, such as the universities at both Oxford and Cambridge entered the correspondence market during the mid-nineteenth century (Mood, 1995). Watkins and Wright (1991) considered William Rainey Harper as the father of modern correspondence education, as did many other educators, because it was he who organized the University of Chicago to include a department of correspondence study. This was recognized as the world's first university distance education program. Gradually, industrial methods of mass production became involved in distance education. In 1969, the British Open University was established. According to Bates (1984), it was a radical innovation because the way teachers taught was based on a combination of broadcasting and written printed text.

Moore and Kearsley (1996) pointed out that there are three evaluative stages of distance education. The first stage is correspondence study. The principal medium of communication is printed materials, sent by mail, like a study guide or assignment.

The second is broadcast and recorded media. The late 1960s and early 1970s was a time of critical change in distance education. It was a time of experimenting with new media in education and new instructional techniques. The establishment of the British Open University in 1969 and the University of Wisconsin's project were two of the most important developments (Moore & Kearsley, 1996). Open University relied heavily on both correspondence instruction and broadcast and recorded media. Radio, television, and audiotapes were used to distribute courses. It also represents a transition to the third stage of distance education. At the third stage, distance educators largely use newly invented technological devices which are interaction by telephone, satellite, cable, and Integrated Service Digital Network (ISDN) lines. Advancements in the 1990s, computer conferencing networks and computer-based multimedia workstations began to be used extensively. The focus of this study is on the newest generation of distance education, Web-based distance teaching and learning.

Theories of Distance Education

Theory is important to the study of distance education because it offers a set of interrelated concepts and definitions that presents a systematic view of the phenomenon, and directly affects the practice of the field (Ary et al., 2000; Simonson, 1999; Simonson et al., 2000). Theory also provides the foundation on which the structures of need, purpose, and administration can be established (Keegan, 1996). Various theories regarding distance education have been proposed. Keegan (1996) in his landmark work, Foundations of Distance Education, categorized the existing theories into three categories: the theories of autonomy and independence, the theory of industrialization, and the theories of interaction and communication. Equivalency

theory also is an emerging approach to distance education (Simonson, 1999; Simonson et al., 2000). In addition, Fordism, Neo-Fordism, and Post-Fordism are an important theoretical debate in distance education. These five classifications of distance education theories will be illustrated in the following paragraphs.

Theories of Autonomy and Independence

The major representatives of theories of autonomy and independence, according to Keegan (1996), are Rudolf Manfred Delling, Charles A. Wedemeyer, and Michale G. Moore. Delling (as cited in Keegan, 1996) sees a distance education course as a learning opportunity in which the distance between the learner and the helping organization is shortened by media. Also he emphasizes the learners' autonomy and independence more than the role of teachers in that learners are adults. The role of the teacher was reduced to a minimum and the function of the helping organization is to provide distance learners information, documentation, and library facilities. There are eight dimensions which he thinks are the components of a distance learning program: learners, learning contents, learning objective, learning result, the whole social situation, a teaching institution, distance, and media used to deliver information. Learning happens without the presence of the instructors but with help of the organization which conducts the different machines, people, and materials.

Wedmeyer, like Delling, believes that distance learners are adults because he used the term "independent study" to describe distance education at the university level. The term independent study, open learning, and distance education was used by Wedemeyer and Childs (1961) to describe learning in non-regular schools. The two bases of his views were democratic society and equal rights, benefits and opportunities for all citizens. Every learner should have access to learn even though

there are obstacles from poor economic situations, geographic isolation, responsibility with job and family resulting in being unable to attend regular education in schools. Thus, independent learners should learn at their own pace. Wedemeyer stated that group instruction was intended for the elite. After the long evolution of human education systems, group learning in a fixed place and time has become a pattern. However, due to the beginning of the printing industry, the establishment of the mailing system, the use of media in teaching and learning, and independent study more people were offered access to education.

Unlike Delling, who reduced the role of the teacher to a minimum, Wedemeyer believes that the secret of a successful distance education program lies with the teacher. Furthermore, Wedemeyer indicated that interactive telecommunications systems are used to connect learners, resources, and instructors and to break space-time barriers to learners. However, if media are used only to replicate a regular class without giving distance learners opportunities to cultivate self-directed learning, the system cannot be defined as independent study.

The development of a theory of distance education based on two variables, the concept of distance and the concept of autonomy was Moore's contribution to distance learning (Keegan, 1996). One variable is distance. Distance between instructors and learners in distance teaching programs can be recognized as being divided into two categories. One is the provision for two-way communication which is labeled as dialogue; the other is the extent to which a program is responsive to the needs of the individual learner, which is labeled as structure (Keegan, 1996).

The concept of distant learners' autonomy is the other variable of distance learning. Keegan (1996) believed that autonomous learners seek to set their own

learning objectives, to find their own methods of acquiring knowledge and to evaluate the result of their learning. Distant instructors provided instructional materials for learners and hoped they were useful for them, but instructors had no control over whether or not those materials were used because autonomous learners used the materials that met their learning goals. In conclusion, learners, teachers, and a method of communication are the three subsystems of a distance education program.

Theories of Interaction and Communication

The major representatives in this area, according to Keegan (1996), are John A. Baath, Holmberg, and Sir John Daniel. The essence of this theory is that interaction and communication are central to any concept of distance education. John A. Baath is Swedish and has made theoretical and conceptual contributions to this theory. During the 1970s he was associated with the concept of two-way communication in correspondence education. As did Wedemeyer, he places a lot of emphasis on distance instructors. The role of instructors is not only to correct errors and assess students' progress but also to have important pedagogical functions such as activating motivation, dialogue with each individual student, and helping students get started.

Holmberg is also from Sweden. His theory is based on the following assumptions: (a) study pleasure and motivation can be promoted by the feelings of a personal relationship between the teaching and learning parties, (b) well-developed materials and technology-mediated two-way communication can be used to cultivate the feelings of a personal relationship, and (c) when information is given and received in a conversational form, it will be easier to retain. As a result, he believes that distance learners benefit from having courses developed for them and also from interaction with their instructors and other representatives of a helping organization.

Thus, the interaction and relationship between the helping organization and learners at a distance are defined as a guided didactic conversation (Simonson et al., 2000). Distance education is regarded as a guided didactic conversation in that the presence of a successful conversation will facilitate learning and motivate learners' participation.

From the above, it can deduced that administration, counseling, teaching, group discussion, enrollment, and evaluation are only important when they can help and support students in the learning process. In other words, the only important thing in education is that learning by individual students takes place. Thus, according to Simonson et al. (2000), the value of Holmberg's theory is that it relates the effective result of teaching and learning to the impact of students' feelings in terms of belonging and cooperation in projects as well as to the actual exchange of questions, answers, ideas, arguments, and discussion in technology-mediated communication.

Sir John Daniel is another representative of this theory. In his opinion, the emergence of distance education was the result of three facts: a long history of correspondence study, advances in communication technology, as well as new experimental and theoretical interest in open learning. The combination of these elements brought in a new educational enterprise to meet the "economic and political needs of societies" (Keegan, 1996, p. 98). Daniel (as cited in Keegan, 1996) approaches distance education from the perspective of the university. Distance education can be divided into two parts: independent activities and interactive activities. For the former, it means distance learners work alone when reading a text or writing an assignment. For the latter, it means activities that bring learners into contact with either the instructors or the other students when conducting group

discussion or commenting on assignments. The difficult and crucial part of a successful distance education program depends on how to balance these two parts.

Daniel (as cited in Keegan, 1996) further pointed out that both independent and interactive activities have a far-reaching and indirect effect on the administration and economics of a distance education institution. If a distance program is conducted mainly in the form of independent activities, then it will be more economical because the cost is low for printing materials and distributing them to learners. However, the cost will increase substantially if a distance education program is conducted mainly in the form of interactive activities. When media technology is used to interact with learners from different places this increases the proportion of interactive activities and improves student performance. In addition, socialization and feedback are a concern in regard to distance learners. Thus there are two economic structures for distance education systems. One is independent activities which are economically possible. The other is interactive activities in which the cost tends to be significant (Keegan, 1996).

Equivalency Theory

Equivalency theory is an emerging approach to distance education, according to Simonson (1999). This states that "distance education's appropriate application should provide equivalent learning experiences for all students, distant and local, in order for there to be expectations of equivalent outcomes of the educational experience" (p. 7). The theory has emerged along with advances in communication technologies which link instructors and learners at various locations and create a virtual classroom which can be free of time-constraints. The two concepts of this

theoretical approach are the concept of equivalency and the concept of the learning experience (Simonson, 1999).

The concept of equivalency means that even though local and distant learners have fundamentally different learning environments, situations and conditions, instructors at a distant, when designing and developing courses, should strive to create equivalent learning experiences to distance learners who have unique needs. When the concept of learning experience is the concern, a positive learning experience including what is observed, felt, heard, or done promotes learning. However, every student requires a different mix of learning experiences. For example, some will need more hands-on experience in learning, others may need more observation and thinking in learning. As a result, the goal of instruction is to design, develop, and deliver courses that make the sum of learning experiences for each learner from various places equivalent (Simonson, 1999; Simonson et al., 2000).

Theory of Industrialization of Teaching

The industrialization of teaching is another theory of distance education. Otto Peters' work throughout the 1960s and the early 1970s became the basis for this theory. According to Peter (cited in Keegan, 1996), all aspects of human life have been changed due to the Industrial Revolution except for the traditional forms of education in different levels of educational institutions. Conventional oral group-based education is a pre-industrial form of education. After examining a research base that included an extensive analysis of European distance educational organizations in the1960s, Peter proposed a new form of industrialized and technological education to meet the needs of 40,000-50,000 students in an university system for the present day industrialized society. Based on economic and industrial

theory, Peter proposed the following terminology for analyzing industrialized education:

1. Rationalization: When the knowledge and skills of a teacher are transmitted to a great many learners at a distance, methodical measures can be used to reduce the required amount of input of power, time, and money.

2. Division of labor: In order for distance education to be more effective, the tasks of conveying information, counseling, assessment, and recording performance can be assigned to many others. Instructors do not have to do all of these tasks.

3. Mechanization: In contrast to conventional education, in distance learning and teaching, mechanization will change the nature of teaching. For example, duplicating machines, transport systems, modern ways of communicating information by computers and the Internet are convenient technologies.

4. Assembly line: Like an assembly line in a factory, where workers remain stationary, but the products pass from one stop to another stop, the same thing can be done in distance education. Teaching materials can be passed from one to another and changed if necessary.

5. Mass production: The production of goods in great amounts in order to reduce the price is the feature of this in industry. As well as it is in distance education. In response to a large demand for courses for many learners at a distance, mass production of courses can enhance quality.

6. Preparatory work: Preparatory work, according to Peters, is very critical to the success of distance education. At this phase, it can be determined how workers, machines, and materials can be coordinated with one another.

7. Planning: Decisions about how the process is operated must be made in advance. The key to a successful distance education institution is planning.

8. Organization: There is a close relationship between rational organization and the effectiveness of teaching methods. A well-organized institution not only makes it possible for students to receive printed materials on time and regularly but also instructors can be immediately available for grading or reviewing each assignment sent in from students at a distance. Furthermore, consultations can happen at fixed locations at fixed times.

9. Standardization: As in industry, unlike conventional teaching, a greater degree of standardization is required in such things as the format of teaching units, the academic content, the organizational support, and written communication between students and instructors.

10. Monopolization: The characteristics of an industrial enterprise are concentration and centralization. A great amount of capital is required for mass production and the division of labor contributes to a concentration of capital, a centralized administration and a market that is monopolized. The same requisites are necessary for a distance education institution with the tendency toward monopolization. The Open University of the United Kingdom is an example.

Distance education, rather than conventional education, is the final stage of education due to the revolution in industry. Thus, it is characterized by six elements: "egalitarian, profane, democratic, aimed at a mass audience, technologically based, and free from the dimensions of educational time, places and persons" (Keegan, 1996, p. 83).

Fordism, Neo-Fordism, Post-Fordism

Based on and expanded from Peter's theory of an industrialized form of teaching and learning at a distance, the theories of Fordism, Neo-Fordism, and Post-Fordism, according to Simonson et al. (2000), has become "the mainstream theory of distance education in international literature and provides a useful analogy in debating the practice of distance education" (p. 38). These three terms represent three ways to conceptualize the production of distance education.

From the point view of a firm's production process and its production strategy, three variables exist. They are product innovation, process variability, and labor responsibility (Badham & Mathews, 1989). Thus, the characteristics of the theory can be approached from these three variables which are listed in Table 1.

Table 1

Variables of Fordism, Neo-Fordism, and Post-Fordism

Variables	Fordism	Neo-Fordism	Post-Fordism
Product Innovation	Low	High	High
Product Life	Long	Short	Short
Mass Production/Mass	High	High	High
Process Variability	Low	High	High
Vertical Integration	Centralized	Mixed	Decentralized
Coverage	National	International	Global
Labor Responsibility	Low	Low	High

Referring to Table 1, the differences between Fordism, post-Fordism, and neo-Fordism can be summarized as follows. Fordism means low product innovation, low process variability, and low labour responsibility. Neo-Fordism conveys high product innovation, high process variability, and low labour responsibility. Post-Fordism connotes high product innovation, high process variability, and high labour responsibility. Campion (1990) and Hodkinson (1997) further illustrated the relation of these three variables to distance education.

The label "Fordism" comes from Henry Ford's archetypal use of mass production. In essence, Fordism is a model of top-down bureaucratic and hierarchical control, designed to achieve technical efficiency in a stable market place. The strategy for distance education suggests a fully centralized, single mode, national distance education provider with a division of labour and production process that is fragmented into component tasks. Courses are developed by a small core of skilled workers and delivered centrally with a de-skilling effect on the teacher. Post-Fordism, derived from Fordism, is a model of management and organization characterized by high levels of product innovation, process variability, and labor responsibility. It is a flexible response to constantly changing educational environments. Instructors are given increased responsibility for continually improving teaching quality and for developing curriculum. Administration would be decentralized and democratic in organization for a flat management structure rather than the many-layered bureaucracies of Fordism. In addition, versions of Post-Fordism are often advanced as the only effective means of an increasingly competitive global market. The focus is on the consumer rather than the product. Neo-Fordism is a term beginning to be adopted by some skeptics of post-Fordism (Hodkinson, 1997). This approach retains

a highly centralized Fordist approach to labor organization and control while course development, delivery, and administration are diversified between a centralized office and regional or local offices. The advantage of this is more flexibility in course development, but teachers are still given little responsibility beyond delivering the developed materials. They are divorced from research, curriculum development, and scholarly inquiry.

According to Simonson et al. (2000), over the past century, much of education is developed based on the Fordist paradigm. The practice of distance education has also come under the influence of Fordist strategy. However, due to the following factors, the position of Fordism has been challenged. First, the demand for centrally produced instruction for mass delivery has been reduced due to open education markets becoming more fragmented, competitive, and specialized. Second, there is a need to adapt to a fast-changing society. Fordism cannot meet the need due to low product innovation, low process variability, and low labor responsibility. Finally, the focus on instructional production and the systematic use of preprogrammed curricula are not able to rapidly respond to high levels of educational needs and quality. In Renner's (1995) words, the Fordist approach to distance education is based on behaviorism which assumes a more passive approach to learning because of a behavioral-based instructional design method for curriculum development, whereas Post-Fordism is closely relevant to constructivism which emphasizes that meaning can be constructed by learners but not installed by instructors.

In conclusion, each theory emphasizes different aspects of distance education. Delling, Wedemeyer, and Moore, who are the major representatives of the theory of autonomy and independence, tend to concentrate on the autonomy and independence

of distance learners. Baath, Holmberg, and Daneil are representatives of the theory of interaction and communication. From their viewpoints, the role of the institution is to provide a satisfactory learning experience for distance learners by focusing on interaction and communication. The spirit of the equivalency theory is grounded on the concept of equivalency both to local students and distant learners due to the advances of communication technology applied in distance education. Otto Peter is the major representative of the theory of industrialization, the focus of which is the functions of a distance educational institution in developing teaching and learning materials from the point view of industrialization. Conventional oral group-based education is a pre-industrial form of education, whereas industrialized distance education is a new form of education originating from the Industrial Revolution. In order to adapt to a fast changing society and to meet individual needs, the systematic use of preprogrammed curricula is incompatible. The constructivism point view of Post-Fordism was developed and revised from the Fordism approach of distance learning since high product innovation, high process variability and high labor responsibility have been receiving attention recently. It is this constructivist approach to distance education that is going to be the focus of the next section.

Web-Based Learning and Instruction: A Constructivist Approach

Currently, the most widely accepted learning theory model in the Web-based learning and teaching environment is constructivism (Cobb, 1994). This section explores the thesis of constructivism and how the theory is applied in teaching and learning via computer-mediated technology.

The essence of this constructivism is that students bring their prior knowledge to the learning experience. Over time and through interaction with others in the learning

environment, learners construct knowledge for themselves (Mosenthal & Ball, 1992). Furthermore, new knowledge is built on former knowledge. Learners are not only viewed as interactive participants in the learning environment but they are also creators and processors of the knowledge being acquired. Thus, a principle of this learning theory is that student-to-student interaction is viewed as an important component of the educational environment. It is the learners who control the learning. They are the builder of knowledge, whereas, the instructors are the managers and facilitators of a learner-centered environment.

From the perspective of constructivists, learners actively participate in setting their own learning objectives, which will, in turn, encourage collaborative and customized learning, as Boettcher (1999) projected. Student-to-student interaction expands their knowledge and is best for problem-based learning, with help from instructors as needed. When designing and developing courses based on this theory, instructors have to be aware of the following three principles (Boettcher, 1999).

First, the continuity of the learning of individuals becomes important. Instructors should meet this need by providing alternatives for students who are learning core materials and by using well-structured content. Web-based courses can meet this demand because there are rich resources to meet learners' different learning styles to construct their own understanding based on their prior knowledge and experience with the world. Next, interaction is critical. According to Moore (2000) and Boettcher (1999), there are three kinds of interaction or dialogues. These are faculty to learner, learner to learner, and learner to learning resources. In the Web environment, the last two interactions are especially important. Dialogues happen among learners by using chat room, e-mail, and so on. Since the Internet is rich in

resources of various knowledge and information, learners can continually renew and update their knowledge by building up a regular dialogue between learners and learning resources from the Internet. Lastly, since learners decide to set their learning objectives, the instructors should create a Web environment in which learners accept responsibility to achieve their goals.

As far as implications of this theory for teaching and learning in the Web environment are concerned, constructivists claim that knowledge is constructed by engaging learners in different activities. These activities stimulate thinking. Learning happens during the thinking process and thus knowledge is acquired. The role of technology in learning is to provide, stimulate, and support activities and knowledge that engage learners in thinking. Therefore, according to Mosenthal and Ball (1992), based on the theory of constructivism, technology can be used as an engager and facilitator to foster and support learning which results in knowledge construction by learners. Technology can also be an information vehicle for exploring knowledge and for supporting the adage, learning by doing.

In conclusion, the constructivist approach believes that learners learn best from what they discover. Instructors act as mentors, mangers, and facilitators. Learners act actively to construct their knowledge by connecting it to their prior knowledge, and interacting with fellow students, instructors, and learning resources via the various media available to them.

The Technology of the Internet and WWW

The Basic Concepts of Networks

It is well known that a computer can use a network to access peripheral devices and to provide communication between people all around the globe. However,

according to Comer (1999), the earliest motivation for developing a network was to share large-scale computational power. Early digital computers were very expensive and scarce. The U.S. government realized that computers were indispensable to science and technology in analyzing data from experiments, but the government budget for research was not large enough to provide computers to all scientists and engineers. The U.S. Department of Defense Advanced Research Projects Agency (APRA) especially needed the newest and most powerful computer to deal with their research, experiments, and projects. Furthermore, Comer (1999) noted that by the late 1960s, the demand for placing multiple computers at each research site could not be satisfied; thus, ARPA started investigating the possibility of data networking: giving each group one computer and interconnecting the computers with a data network and devising software to control the process. At the beginning, ARPA faced a lot of challenges, such as not knowing how to build a large, efficient data network and write programs to control a network. Even some computer scientists doubted that it could be done. As a result of this problem, the ARPA networking research had a revolutionary consequence. The project was called the ARPANET and continued to innovate and evolve into a technology known as internetworking.

By the 1970s, the early Internet emerged. Research and improvement continued into the 1980s. In the 1990s, the Internet became a commercial success. The word, internet, is simply a contraction of the phrase interconnected network. However, when it is written with a capital "I", the Internet refers to a worldwide set of interconnected networks. The Internet is an internet, but an internet is not the Internet (Murhammer et al., 1998).

Data Transmission

At present, Comer (1999) pointed out that the Internet has grown from an early prototype to a global communication system. It has reached far into every aspect of life. People access information from the Internet easily. But, how are data transmitted to users and what media are used for transferring data to them? Copper wires and optical fiber are used for transmission in modern network systems. Conventional computer networks use copper wire as the primary medium to connect computers in order to transfer data. Wire is not expensive and it is easy to install, but it has a low resistance to electrical interference. Computer networks also use flexible glass fibers, known as an optical fiber, to transmit data. This does not cause electrical interference in other cables because it uses light; and, light can travel from one computer to another over a single fiber.

Next the formation of LAN and WAN will be discussed. It is Dodd's (2000) explanation that in general, depending on the size of networks, a network technology is classified into one of three categories: a Local Area Network (LAN), a Metropolitan Area Network (MAN), and a Wide Area Network (WAN). When a group of data services, such as computers, printers, and scanners communicate with each other within a limited distance in a single building or campus this is defined as LAN. If a group of data devices, such as LANs, can deliver and receive digital signals among one another within a city or a large campus area across many blocks this is called MAN. Finally, when a group of data devices, such as LANs, send and receive information from multiple cities, countries or continents this is defined as WAN. Devices on LANs are linked together by twisted copper pair wire called hubs. Each node or device is wired back to the hub in a star design or topology, which can

be seen when viewed from above. Many LAN technologies including Ethernet, Cable Modem and ATM (Asynchronous Transfer Mode) have been invented to connect devices to form LANs in a star, ring, or bus topology.

A LAN is not considered a WAN because of bandwidth limitations, which prevent a LAN from serving many computers at many sites. A WAN must be able to grow as needed to connect many sites across a large geographic distance to form a network. A WAN can handle many computers at the same time because it is constructed from many switches to which individual computers connect instead of using a point-to point leased data circuit that connects one computer directly to another. Unlike LAN technologies, which require computers to divide data into small packets called frame and to transmit one packet one time, WAN technologies can transmit many packets to different computers at the same time by interconnecting a set of packet switches. Additional switches or interconnections can be added as needed to increase the capacity of a WAN. Thus, a typical WAN consists of electronic devices called packet switches interconnected by communication lines (Dodd, 2000; Sharda, 1999).

The above section described basic communication hardware consisting of mechanisms to transfer bits from one point to another to form LAN and WAN systems. The next section will examine the structure of the software used with network systems. In addition to hardware, network systems have complex protocol software that controls communication among different devices. Protocol, according to Dodd (2000), is like etiquette between computers. Among people, there are rules for how people greet each other, who shakes hands first, and so on. Similarly, protocols form the orders in which computers converse with each other to decide

which one transmits messages first, how long a computer should wait before a transmission is terminated, and so on. Thus, software that implements such rules is called protocol software. Instead of having a single, giant protocol that deals with all details for communication, designers have divided communication software into multiple protocols. By doing so, it becomes easier to design, analyze, implement, and test the different subsets of protocols. Each subset of protocols is not developed in isolation. They are designed and constructed in complete and cooperative sets called suites. As a consequence, each protocol in a suite can solve a part of the communication problem. Collectively, they can solve all of the problems (Comer, 1999; Dodd, 2000).

In conclusion, both hardware and protocol software control communication in a network. The following section will be about the significance of internetworking and Transmission Control Protocol (TCP)/Internet Protocols (IP).

Internetworking

The preceding section was about the hardware components used in LAN and WAN networks and the function of protocols. This section will examine a fundamental idea in computer communication. That is an internetworking technology that can be used to connect multiple physical networks into a large, uniform communications system. LAN technologies are designed to provide high-speed communication across short distances, while WAN technologies are for large expanses. LANs and WANs can be connected to form a system. However, the difficulty is that each network is like an island; thus, electrical incompatibilities can make it impossible to form a large network merely by interconnecting the wires from different networks.

Researchers have devised a scheme called internetworking or internet which uses both hardware and software to deal with the problem. Hardware systems are used to interconnect a set of physical networks, while software on all the attached computers provides a way to connect and interact with computers at different sites all over the world. The basic hardware component used to connect a heterogeneous network is a router. Each router is a special-purpose computer dedicated to the task of intereconnecting networks. This computer has a conventional processor, memory, and a separate I/O interface for each network. Routers make it possible for an organization to choose network technologies appropriate for each need, and to use routers to connect all networks into a single internet. For example, an internet can be formed by using three routers to interconnect four physical networks. Each network can be a LAN or a WAN (Black, 1999).

The TCP/IP technology, developed in 1982, made a global Internet possible. Data delivery service is provided by IP. TCP provides a reliable data delivery service to application programs. In other words, TCP guarantees that data will not be lost, duplicated, or delivered out of order. TCP/IP protocols are organized into five conceptual layers (Black, 1999; Murhammer et al., 1998).

Thus, an internet is a collection of networks interconnected by devices called routers. Each router in the internet must run TCP/IP to allow application programs to exchange packets. TCP/IP protocol software works and handles large internets. Currently, TCP/IP is used on the global Internet and has reached over 5 million computers in 82 countries (Comer, 1999).

In conclusion, computers on the Internet communicate using a common language, or protocol, called TCP/IP. A message on the Internet is divided into

sections, called packets. TCP puts these packets in secure envelopes. IP adds the address of the destination computer. When the packets reach their destination, they are reassembled into a readable message by routers.

Network Applications

The previous section has examined a general description of LANs, WANs, and TCP/IP. The next section will be about network applications. The focus will be on the following three aspects: (a) an explanation of the client-server model of interaction, (b) the World Wide Web (WWW), and (c) Hyper Text Markup Language (HTML).

The concept of the client-server structure began in the mid-1980 (Moschovitis, Poole, Schuyler, & Senft, 1999). The terms client and server refer to the two applications involved in a communication. A client, which is in a user's computer, actively initiates contact whereas a server passively waits for contact. Several programs usually run on large, server-class computers that have sophisticated operating systems. The client requests the server for data. The server sends the packets on to routers which are computers that link networks together on the Internet. Routers can be thought of as regional post offices because they sort each packet of data and then transmit it to either other routers or another server. Transport protocols are used to communicate between clients and servers. To be more specific, clients are the PCs and servers are the larger computers that feed data and software applications to individual PCs (Comer, 1999; Kaye & Medoff, 1999).

According to Moschovitis et al. (1999), the Internet used only text prior to 1990. There were no graphics, animation, or colors. There were no friendly interfaces like Netscape and Internet Explorer. People had to learn computer languages such as

UNIX (a corporate trade name) command in order to communicate with computers. The Internet was not commonly used. The advent of the World Wide Web in 1989 and web browsers in 1993 completely changed the Internet. Computer scientists at the University of Minnesota developed Gopher, a network browser, for finding and viewing information stored on remote computers (Moschovitis et al., 1999)

The World Wide Web was developed at Center European pour la Recherche Nucleaire (CERN); European Laboratory for Particle Physics) in Geneva, Switzerland by Tim Berners-Lee, often referred to as the "Father of the World Wide Web" (p. 69) as observed by Moschovitis et al. (1999). He was born to be a computer scientist in London, England as both his parents worked to develop an early computer called the Ferranti Mark I. As a child, Tim showed his talent in the field. After he was granted a fellowship at CERN, in 1989 he completed the original software for the World Wide Web, a hypertext data system. He regards the WWW as a shared information space, in which people are able to communicate with one another and with computers all over the world.

Berners-Lee continued to facilitate the design and construction of the WWW at CERN. In 1994, he moved to the United States to join the Laboratory for Computer Science at the Massachusetts Institute of Technology (MIT) as a director of a new organization, the WWW Consortium. He was awarded in 1998 a MacArthur Foundation genius grant for creation of the World Wide Web. The reason why the WWW became so widely accepted was that Berners-Lee chose not to copyright it and make a profit from his invention. He was committed to making the WWW public in order that everyone had access to it to gather and offer information (Moschovitis et al., 1999).

The WWW has three important features. The first is Uniform Resource Locator (URL) that is a set of codes that specify the location of the files on the Web servers. A URL includes the type of resource being accessed, the address of the server, the location of the file as well as an address scheme. By keying in a URL, users can go to the target place within the WWW. The second feature is Hypertext Transfer Protocol (HTTP) which is a set of rules used to access data and traverse hypertext documents on the WWW. All Web addresses begin with http://. Hypertext Markup Language (HTML) is the third feature (Kaye & Medoff, 1999; Moschovitis et al., 1999).

HTML, according to Gehris (1998), is the World Wide Web programming language. It is made up of a set of commands that tells the Web browser how to display a Web page's words and images, and how to link pages and documents. Web page designers use many commands to determine how their documents will appear online by formatting the page using the proper HTML codes. For example, each HTML document is divided into two major parts: a head tailed by a body. The head contains details about the document, while the body comprises the majority of the information. An HTML document starts with the tag <HTML> and ends with the tag </HTML>. A pair of tags <HEAD> and </HEAD> bracket the head, and a pair of tags <BODY> and </BODY> bracket the body. In the head, the tags <TITLE> and </TITLE> bracket the text that forms the document title. Also, HTML includes six pairs of tags that can be used to display headings in the output. Nontextual information such as graphics image or a digitized photo is included in an HTML document by using the IMG tag to encode an image.

The development of Web browsers opened up the Internet to users without computer skills. Web browsers present online information in readable form and allow

people to browse the Web by navigating from site to site. Browsers interpret the formatted commands of HTML. Prior to the Mosaic browser developed in 1993, there were browsers which included Erwise, Midas, Cello, and Viola-WWW. These paved the way for Mosaic, which in turn led to the ubiquitous Netscape Navigator and Microsoft Explorer (Moschovitis et al., 1999; Williams & Tolett, 1998).

In conclusion, this section was concerned with the technology of the Internet and the World Wide Web. It is a fact that the Internet and the Web are changing the lifestyles of millions of people who have grown to rely on them as a source of information, entertainment and communication. The Internet and the WWW have also had a big impact on educational institutions.

Web-Based Distance Education in Taiwan

National Information Infrastructure (NII) was launched in the United States by the Clinton-Gore Administration in 1993. Ever since, every country imitated NII in order to catch up with the advance of communication technology and to be able to be well prepared for a new millennium. For example, there is in Singapore, "IT2000", in Japan, "Information New Policy" and in Hong Kong, "Five-Year Strategy" (Ho, 2001). Similarly, in Taiwan, the Executive Yuan set up a NII plan in June of 1994 and established task forces to build a national information highway. Seventeen projects were conducted with the first priority. Two of them, "Email to Secondary Schools Project" and " ATM Testbed Networks for Interactive Distance Learning Project" had a great influence on the Taiwan educational environment (N. S. Chen, 2002). Much effort has been made with the expectation that, on the basis of the development of Internet technology, Taiwan could become a society where the Web can expand access

for common people to enormous new knowledge resources. Thus, Web-based distance education can carry out the goal of life-long learning (T. S. Wu, 1998).

In this section regarding Web-based distance education in Taiwan, the following issues will be explored: (a) the plan and development of Web-based distance education, (b) current situations of Web-based distance education in schools, (c) teachers who are IT competent in education, and (d) conclusion.

The Plan and Development of Web-Based Distance Education

The pre-stage plan and development of Web-based distance education was first initiated by the Ministry of Education in 1994. The main work of this stage was to establish experimental systems to deliver courses by experienced universities. In 1997, a final stage of the four year distance education program was put into action. The goals of this program have been noted as follows (Ministry of Education, 1999).

1. By connecting networks, courses can be taken from various schools, cooperation can be established among various educational institutions, and a global learning environment can be achieved.

2. Foreign techniques can be imported to help produce and develop teaching materials for the various levels of educational institutions, including special education.

3. Providing in-service to teachers, enterprise employees, and government employees in that training is the most urgent need. In order to keep up with the constant change in concepts, technology, and environment, people have to update their knowledge and techniques. But due to various responsibilities and time constraints, online learning can be a way to improve this situation. Currently, in

Taiwan, there are about 100 universities. In the future, every university will be able to offer online courses to everyone who wants to take courses online.

4. To cultivate, educate, and train professionals in various subjects such as curriculum design, development, and delivery, teaching, and engineering techniques is also necessary.

5. In order to have a multi-dimension Web-learning environment, there is a need to encourage private enterprise to take part in the development of the Internet.

In addition to the four year distance education program, the Ministry of Education launched the following plans to lay a foundation for online learning (Ho, 1998).

1. The Information Education Plan is a period of 10 years from July 1997 to June 2007 in which the primary purpose is to continue and expand the plans which are being performed so as to improve information education in every school, to develop computer aided teaching and learning software, to have at least a computer lab in every school, and to connect all schools by the Internet.

2. The Development and Cultivation of Professionals of NII, which operated from July 1997 to June 2001used to train professionals in multimedia, Web-based distance education, and to be in charge of various relevant activities.

3. The Net of the Whole Society in Information Education Plan, implemented from July 1997 to June 2002 to set up a convenient Web-based learning environment in order to launch lifelong learning for all people.

The plans were all well connected to reach the goal of constructing an Internet based environment for society. The next concern to be discussed will be the present

situation of Web-based learning and teaching in the different levels of educational institutions.

Current Situations of Web-based Distance Education in Schools

In the past few years, due to the implementation of the various plans mentioned previously, the construction of the infrastructure has been basically completed. This includes the provision of hardware and software to schools, and the setting up of the networks within and among schools. For example, Taiwan's three major Internet Services Providers (ISP) are Taiwan Academic Network (TA Net), HiNet, and SEEDNet. The last two are for commercial use. TANet was initiated in 1990 by MOECC, the Computer Center, Ministry of Education. There are three layers of structure associated with it, the National Backbone Network, Regional Network Centers, and Campus Network. These three layers are responsible for the connection of regional network centers in Taiwan and international links to the US. The aim of TANet is to support and encourage educational research activity, share information and offer opportunities for cooperation among universities. Furthermore, substantial funds have been made available to promote the use of information technology in education and a clear vision of the future, which is a network-based society, has been established. All of this provides a solid foundation upon which Web-based distance education can be developed and implemented (Han, 2001).

Currently, two types of Web courses being offered by higher education are "Non-credential Web courses" and " Credential Web Courses" (Ministry of Education, 2001). The former means that learners get credits but no diploma. Most learners are working people without student status. The latter is exclusively for formal students. These two types of Web-courses can be classified into three ways to conduct the

courses. One is only to upload learning materials on the Web for students' reference. Another is that via information exchange and online discussion, students can learn from each other; however the time spent on the line is not included in the class. The last one is a complete online course, no class interaction. For this, instructors who offer the course have to follow the rules setup by the Ministry of Education of Taiwan (Ministry of Education, 2001). Also, some universities can cooperate to provide a program for taking courses where universities collaborate to provide courses which can be taken by students from the universities which are in league with one another by deploying the Asynchronous Transfer Mode (ATM) networks. Students in these higher educational institutions can take the courses and the credit is accepted by their own university.

As mentioned previously, the project for E-mail Going to Secondary Schools was one of the main tasks of NII's 17 projects. The main purpose of it is to enable teachers and students of secondary schools to cultivate the ability of using network resources. The three stages of performing this project were listed in Table 2.

The project cannot only be considered in its literal meaning, but it also includes integrating information technology to create a diversified educational environment, to offer students more global learning resources, and to promote the Internet to be an educational environment for all levels of education. In order for this aim to be carried out, a teaching force which is competent in the use of Information Technology (IT) is an important consideration. This is the concern of the following section.

Table 2

Three Stages of Email to Secondary Schools Project

Three Stages	Objectives
The Early Stage (before 1998)	1. To complete the special cable connection to the educational and research networks of universities and colleges. 2. To establish an educational network center for every county and city. 3. To provide the method of dialing-in to use the resources of a local educational network center. 4. To reach 30% of the students of the secondary schools, colleges, and universities and for them to use E-mail and network resources.
The Middle Stage (1998- 2000)	1. To establish information service system of junior and elementary schools and improve on the traditional way of teaching. 2. To cooperate with the developmental progression of communication networks so as to proceed with the exchange of multimedia information. 3. To reach 60% of the students of the secondary schools, colleges and universities and for them to use E-mail and network resources.
The Long-term Stage (After 2000)	1. To widely establish service points, that is, at every electronic site to set up an educational network center. 2. To reach 80% of the students of the secondary schools, colleges and universities and for them to use E-mail and network resources. 3. To popularize the application of network information, in order to reach the objective of universal informationlization.

Note. Source: N. S. Chen, 2002.

Teachers Who Are IT Competent in Education

The application of IT to education has been a significant challenge to teachers. Today's teachers are not the center of attention any more, but, with the aid of IT, can become learning facilitators. In order to fulfill their teaching jobs, teachers have to deal with three issues in this digital learning environment. These are the changing views of learning and teaching, the development of technical IT skills, and IT competency in education (S. S. Chen & Chu, 2000; Lin, Ma, & Lin, 2000; Wen, 1999).

The educational system set up during the Industrial Age is undergoing reform in order to cope with the change to an information society. In the 1950s and 1960s the teaching paradigm was a piece of chalk, an eraser, and a blackboard. In the 1970s, teaching was facilitated with videotapes. Up to the 1980s, satellites were used to deliver courses to learners or computer assisted instruction was used to help educate learners. Currently, the educational paradigm has again shifted to the use of information technology to deliver courses online (Ho, 1998). The success of information education definitely hinges on a teaching force that is able to adapt to a new educational framework, form, and contents.

In order to be able to adopt new ways to deliver knowledge and skills, IT competency for the sake of using IT and the application of IT in education must be involved. A set of professional development strategies, programs, and activities for Taiwan's teachers using in-service and pre-service for faculty members' IT education has been proposed and implemented by Taiwan's educational leaders in the Ministry, the universities, and research institutions. For example, there are many Internet classes to train people how to get on the Internet and TANet conferences for steering

new technologies and applications are held. Table 3 shows the different levels of IT competence (S. S. Chen & Chu, 2000).

Table 3

Level of IT Competence

Levels	Domains
Basic	Basic computer & Internet technology operations and concepts
Intermediate	Personal and professional use of IT; capability in using readily available educational courseware
Advance	Application of IT in education

The Basic level and part of the Intermediate level are related to the development of technical IT skills which include a person's ability to operate multimedia computers, to make effective use of the Internet to collect data, manage information, make decisions, communicate and present information, and to use peripheral equipment.

Part of the Intermediate level and Advance level pertain to the range of IT competence in education. This includes using IT to facilitate and enhance the learning of the students on the Internet, to be aware of the paradigm shift in learning and teaching, to become frequent and sophisticated IT users in teaching, and to be able to conduct courses online. Furthermore, a teacher who is IT competent should have the ability to advise IT to plan and promote IT culture in the school (Han, 2000).

To conclude, to be aware of the changing view of learning and teaching in the computer network era, to develop technical skills in IT, and to be able to apply IT in education are the three issues which should concern today's teachers.

Conclusion

Every country in the world is making its best effort to attain economic growth and to enhance productivity. A way to reach these goals is by educational reform. Definitely, Taiwan will not be left behind in this new information revolution. Government has set up various national plans to install information technology in the educational environment.

In order to be able to carry out IT education successfully, the following three general issues should also be considered. The first issue is the cost of facilities (I. Z. Chen, 2000; Ho, 1998). The more resources that are involved in teaching and learning, the more funding has to be a consideration. The second one is the re-training by in-service of teachers to act in accordance with the new way to teach (I. Z. Chen, 2000; Han, 2000; T. S. Wu, 2000). Not every one can transfer smoothly from the old paradigm to the new one. The third one is how much general people and teachers are willing to take and offer online courses (I. Z. Chen, 2000). This is new and very different from the learning and teaching style with which they are familiar.

This section has been related to Web-based distance education in Taiwan. Aspects of this, such as, various plans regarding distance education, the present situations of web-based distance education in different level of schools, and faculty members' IT competence were explored. The next section focused on Web-based international distance education.

Web-Based International Education

This section is about international education deployed by Internet technology, which Tom Peter "proclaims the death of the distance and the arrival of globalization" (p. 94; cited in Kelly, 1998). The theme, internationalism in distance education was first mentioned in International Council Correspondence Education (ICCE) conference in 1938. Now it is known as International Council for Distance Education (ICDE). No conference had focused on this theme again until the one held at Pennsylvania State University in June, 1994 (Thompson, 1994).

Internationalism was defined by Moore (1994a) as " the practice of teaching and learning across national borders" (p. 1) by means of communication technology. This theme used to be of very marginal significance in the field of education in North America and elsewhere in the world. Now, however, it has been receiving a lot of attention. Many higher education organizations are being attracted to the practice of global education on the Internet (Duin, Baer, & Starke-Meyerring, 2001).

From a review of literature, the term globalization and internationalism both mean technologically mediated education between at least two countries of the world. The focus of this section will be on (a) motives for global education, (b) issues in global education, and (c) applications of global education.

Motives for Global Education

What contributes to the growing practice of global education? According to Moran and Murgridge (1993) and Moore and Lambert (1996), four motives encouraging educational collaboration are economic, educational, political, and ideological. Also, the distribution of world population is a factor (Dhanarajan, 1998).

Economic motive. Two factors that push institutions of higher education to form collaborative partnerships are increasing economic pressures and shrinking budgets and the increasing number of entrepreneurs who view the new delivery systems of distance education chiefly from the perspective of making profit (Mason, 1998; Moore, 1996).

The most critical factor which influences administrators and policy makers of higher education is financial pressure on institutions worldwide. They look to global markets as a way to respond to governmental pressure in the form of reduced expenditures and the falling numbers of traditional learners (Mason, 1998). Thus, there is a need to collaborate in distance learning for higher education to increase their competitive ability and to remain viable. The positive effects of collaboration in higher education, according to Gatliff and Wendel (1998), are sharing the use of limited human and financial resources, maximizing limited resources, course offerings, teaching, learning, and research, and increasing enrollments in under-enrolled courses.

Besides the dwindling educational budget that pushes the collaborative partnership of post-secondary institutions around the world, the greater use of communications technologies in education is also a factor. Distance educators are also concerned with the increasing number of entrepreneurs who compete with educational institutions in providing education products and services to the general public. This is the so-called "cultural industries" (Trindade, 1994). Cultural industries already have the channels and equipment to provide education and training with convenience to the public.

Educational motive. In addition to the economic reasons, changing educational paradigms also make international collaboration in distance education necessary. Neil (1981) identified some potential advantages to institutions. First, the materials of community-based programs such as Adult Literacy and English as a Second Language can be developed through cooperation. Improvement of the quality of teaching, as the second reason, can be achieved by collaboration to increase the range and pedagogical and technological strategies. Third, collaborating to open educational opportunities to more learners than traditionally served and creating the relevant programs to meet students' needs are another advantage. Finally, collaborative initiatives have the capability to resolve large problems, to be more productive in implementing the desired changes, and to use collective resources to face challenges.

Political motive. The influence of state and national politics on education also makes inter-institutional and international collaboration at the local, regional, and international levels possible. There are multipurpose aims for the development and acceleration of educational collaboration across national borders. For example, the International Council for Distance Education (ICDE) is one of the largest systems for international distance education. The mission of it is to assist developing nations to get educational resources from developed countries (Moore, 1994b). The expansion of networks across countries in Europe was initially used for improving trade and promoting economic activities to fight unemployment. Later on, it was used by the European Association of Distance Teaching Universities (EADTU) and the European Distance Education Network (EDEN) for educational purposes such as to conducting research, developing projects, and interchanging courses and materials (Trindade, 1995). Also collaboration is a potentially effective in helping students in the more

economically underdeveloped parts of the world to satisfy their needs in pursuing knowledge to be able to improve their living and to enhance the richness and quality of educational resources.

Ideological motive. In addition to the motives mentioned above, there are also ideological reasons for engaging in collaboration across national boundaries. The spread of global communication systems has directed the course of larger social changes. As a matter of fact, as Mason (1998) stated, the growth of transnational education is "a reflection of society's increasing understanding of the interrelatedness and interdependence in the physical world" (p. 7). The unstable global environment is a potential problem for everyone; it is not possible for any individual or any level of social organization to resolve the problems. International collaboration in education has the potential to improve mutual understanding and lead to greater tolerance. This situation in the world can be improved by creating a structure to produce mutual understandings among countries. International education is a structure that provides a solution to this unstable global environment in that educational opportunities and resources are opening up to the general public (Moor, 1996).

Distribution of population. The population of the world also is a consideration for the implementation of distance education. Over the next ten to fifteen years, the population will grow at an annual average rate of about 1.6%. Table 4 shows the world population distribution in more developed and less developed regions from 1990 to 2010 (Dhanarajan, 1998).

Table 4

Projected World Populations

Region	1990	1995	2000	2005	2010
World Total	5,295,300	5,759,276	6,288,254	6,688,159	7,149,499
CAGR		1.7%	1.6%	1.4%	1.3%
More Developed Regions	1,211,138	1,244,176	1,277,963	1,310,427	1,340,532
CAGR		0.5%	0.5%	0.5%	0.5%
Less Developed Regions	4,084,162	4,515,100	4,950,291	5,377,732	5,808,967
CAGR		2.0%	1.9%	1.7%	1.6%

Note. Numbers in millions. CAGR: Compound Annual Growth Rate (for previous five-year period). Source: P. M. Callan, Future Scenarios: Education and Work. Report on the Conference on Directions: Education and Training for 15-24 year olds. Sydney, Australia, 1994.

In addition to the uneven distribution of world population, Table 5 shows projected changes in the 15-24 year old population. From the table, it can be seen that the growth is not even. The highest birth rate will be located in the poorest countries, while the population of the rich and industrialized countries will stay stable and even have negative growth. An older population will have an impact on education. The population of these over 65 years of age in richer but slower growth countries is increasing; however, the number of young men in the less developed regions of the world will increase dramatically. As a result, it is these underdeveloped areas that need education the most (Dhanarajan, 1998).

Table 5

Projected 15-24 Year-Old Population

Region	1990	1995	2000	2005	2010
World Total	1,014,940	1,031,809	1,070,638	1,159,319	1,240,839
CAGR		0.3%	0.7%	1.6%	1.4%
More Developed Regions	180,760	177,252	175,345	175,800	174,967
CAGR		- 0.4%	- 0.2%	0.1%	- 0.1%
Less Developed Regions	834,179	854,566	895,293	983,520	1,065,872
CAGR		0.5%	0.9%	1.9%	1.6%

Note. Numbers in millions. CAGR: Compound Annual Growth Rate (for previous five-year period). Source: P. M. Callan, Future Scenarios: Education and Work. Report on the Conference on Directions: Education and Training for 15-24 year olds. Sydney, Australia, 1994.

From the point of view of the rate of illiteracy around the world, according to Dhanarajan (1998), roughly, about one-fifth or 960 million of the world's population cannot read and write, most illiterate people are located in the poorer nations. Thus, it is clear that these countries are facing struggles with illiteracy, under-education, under-supply of education resources, and quality of education. In one word, education to all economic levels of these countries is appalling. Table 6 lists the world population participating in education.

Table 6

Rate of World Population Participating in Education by Level (World Totals), 1970-1990

Level	Years	Rates
First Level	1970	89%
	1990	99%
Second Level	1970	36%
	1990	50%
Third Level	1970	8.5%
	1990	12.7%

Note. Source: P. M. Callan, Future Scenarios: Education and Work. Report on the Conference on Directions: Education and Training for 15-24 year olds. Sydney, Australia, 1994.

The conclusion based on the data of Tables 4 to 6, is that collaboration in global education across nations is necessary in that it has a potentially effective and efficient means to meet common needs such as improving the rate of literacy for developing or under developed countries. As Moore (1994b) said,

> Students in the more economically underdeveloped parts of the world can learn from the best teachers, using the best materials, and can electronically access the best libraries simultaneously with colleagues in the most advanced economies. At the same time, such communication resources make it possible for students in economically advanced countries to learn from and to be enriched by the greater artistic, cultural, and spiritual sophistication that is frequently to be found in the less economically developed countries. (p. 4)

Issues in Global Education

As new technology pushes us towards international collaboration in higher education, academic globalization has become a trend. However, some issues are generated with the coming of internationalism, for example, cultural diversity. According to Mason (1998), "the big issue in global education is the cultural one. Most practitioners have hardly begun to tackle it. Much of the promise of the globalization movement in education depends on how successfully cultural differences are addressed" (p. x). Thus, an appreciation of the role of culture in education is essential because it leads to a deeper and more valid understanding of the nature of student learning.

The term, culture, is defined as views, values, norms, expectations, and conventions for behavior that are typical for a specific society or community (Branden & Lambert, 1999). Researchers have studied the relationship between knowledge acquisition and culture. Observations from the Western schooling and learning tradition can be made in comparing other people's cultures. For example, from the Western point of view, the sense of reality has been shaped by a mechanical worldview; thus, emphases are placed on quantification and universal statements. Learners are led by orthodoxy and stress authority rather than experience. Knowledge transfer focuses more on the data than on the process of transfer. However, the Eastern culture's sense of reality is more holistic. It emphasizes interdependent relationships of living things, nature, and the environment. As a result, learners from non-Western traditions are seen to emphasize more cooperation, experience, group harmony, intuition, and reflection (Doll, 1989; Gough, 1989).

The above differences in the cultural dimension can contribute to interpreting and constructing the knowledge in different ways by students from different cultures. As a result, when designing learning technologies and methods, social and cultural contexts must be taken into account. In addition to the influence of cultural diversity on knowledge building, linguistic differences are a crucial factor hindering intercultural collaboration (Cohen & Miyake, 1986). The individual makes sense of the world through language and the process of active interaction with other individuals. In addition to spoken language, communication can also be achieved in various ways such as differences in style of writing, presentation of arguments, loudness of speaking, body language and body distance. However, these various ways of communication are culturally bond and they can hinder communication.

To sum up the focus of this section, issues in global education are the influence of culture on knowledge building and language in virtual instruction. These two factors are two challenges for the success of a cross-nations distance education. The next section is on the cases of current global education.

Applications of Global Education

This section is about current applications of global education. Presently, there are quite a few educational institutions offering global education programs. Duke University in North Carolina offered a course, Global Executive MBA to 45 students from many countries (http://www.fuqua.duke.edu), and there is the UK Open University (http://www.open.ac.uk/). In this section, the example used of the application of global education is the Graduate Certificate in Open and Distance Learning, University of Southern Queensland (USQ) in Australia (http://www.usq.edu.au). According to Mason (1998), this course is a series of Web-

based courses aimed at academic and training personnel who want to acquire and improve their knowledge and skill in the design, development, delivery, and management of distance education.

USQ got involved in distance education in 1977. At present, it has more than 16,000 students enrolled from all over Australia and 2,000 to 3,000 students enrolled as distant students from countries such as Kuala Lumpur, Singapore, Hong Kong, and Malaysia. USQ also has established a number of offices abroad. This series of Web-based courses were initiated by funding from the Australian Federal Government and a Global Learning Initiative of AT&T and the International Council for Distance Education (ICDE).

Structure of the course. Courses are composed of tailor-made Web pages, interaction through a Web conference system and recommended readings. Like most other courses conducted online, the bulk of the content of the courses in the program is actually the reading, with the Web materials offering a framework and guide to the subject.

Mason (1998) noted that there is a team of academics and support staff from various departments and centers to coordinate the program and to consider relevant issues in supporting Web-based courses. Each topic in the course follows the same pattern: experiencing, reflecting, conceptualism, and applying the learned concept. It means that after students study the material provided on the Web, they need to reflect on the ideas, then they interact online with the tutor and other students to enter the conceptualization phrase. The final stage is to apply the concepts by doing assignments.

It is worth mentioning that a library assistant was hired to support the course to search the Internet for the relevant support materials for the courses. There are many electronic journals, magazines, and newsletters. All relevant materials from the Web were pooled into the program "Treasure Trove" to offer students well-prepared references and links. In addition, the library offers a Virtual Reference Desk to support the course.

Student feedback. Mason (1998), based on her interview with distant learners in person or by mail, pointed out some problems that needed to be examined. The first is the access problem. A student from Brazil finally gave up registration because of poor Internet connections. And students from the Solomon Islands had difficulties in logging on to the Web. Culture and second languages are another challenge. It seemed that assignments produced by some of the second language users were very poor. Furthermore, writing and spelling were poor. Communication problems were linguistic and cultural. As a result, the discussions were dominated by English speakers. The tutors had a dilemma because pointing out linguistic errors made the situation worse. In spite of the above negative feedback, there was a favorable comment about Web conferencing. A student stated that it was valuable for sharing reflections with others.

Challenges to face. After reviewing the application of the courses offered by USQ, Mason (1998) had some reflections on the current problems regarding global courses:

1. Access to the Web is still a problem around the world. It needs to be solved in order to provide more access to learners located in these problem areas.

2. In order to run online interactive courses smoothly, many course providers need to become more proficient in writing materials for Web environment learning.

3. Student discipline for those who enroll in Web courses needs to be developed so that there is a study pattern and so that they support participation in the online course.

4. The course designers need to be aware that the discussion can be dominated by English speakers due to cultural and linguistic barriers.

5. As more and more educational technology is used to facilitate teaching and learning, institutions need to develop expertise in using media and maintaining a small-scale course in order to build up experience in the Web.

In conclusion, a dramatic global change in economics, education, politics, and ideology, as well as, the distribution of world population has made internationalism in education possible and necessary. Collaboration becomes imperative for educational institutions to move toward providing global access to their programs. When courses are offered to a global student body, cultural diversity is a critical point for the success of a course. Currently, there have been an increasing number of educational institutions offering courses across national borders.

Summary of Literature Review

Chapter II is a review of the literature related to this study. The six sections are: (a) the definition/evolution of distance education, (b) theories of distance education, (c) Web-based learning and instruction: a constructivist approach, (d) the technology of the Internet and WWW, (e) Web-based distance education in Taiwan, and (f) Web-based international education. These are the foundation of the development of the questionnaire. Part III of the questionnaire, perceptions of web-based international

education programs, is related to section (f), Web-based international education. Part IV of the questionnaire, skills with computers, World Wide Web (WWW), and Web Course Management (WCM) tools related to design, development, and delivery of web-based courses, is related to the section (d), the technology of the Internet and WWW. Part I and part II of the questionnaire, instructor's perspectives of educational technology and attitudes regarding Web-based distance education, can be related to all sections of the literature review.

Next, in the following chapter, the focus is on the methodology applied to conducting this research.

CHAPTER III

METHODOLOGY

Introduction

The two research problems of this study were to establish faculty attitudes regarding a distance education instructional program for maritime technology institutions in two seafaring countries and to examine the readiness for offering certificates to seafarers via international education with countries who are members of the United Nations. There were two purposes to this study. One was to identify and determine faculty attitudes and intentions about adopting distance educational methodology. The other was to develop guidelines for a program in preparation for implementing Web-based distance education for the faculty members in Taiwan.

In other words, the points of the problems and purposes were the attitudes of the faculty members of maritime technology in Taiwan and in Australia regarding Web-based distance education, the readiness to adopt new ways to teach, and guidelines for a program in preparation for implementing Web-based distance education. In order to solve the problems, to fulfill the purposes, and to collect data from the respondents to evaluate the faculty members' attitudes regarding Web-based distance education, the self-implemented questionnaire was used. The questionnaire was composed of six parts (located in Appendix C) and the following research questions were implied. Appendix B lists in detail how the items on the questionnaire addressed the research questions.

1. What are the similarities and/or differences in attitudes and intentions regarding Web-based distance education and Web-based international education

programs among the faculty at nine vocational high schools, two junior colleges, the two universities in Taiwan, and the faculty at AMC in Australia?

2. What is the relationship between perspectives on educational technology and Web-based education?

3. What is the relationship between perspectives on educational technology and Web-based international education programs?

4. What is the relationship between Web-based distance education and Web-based international education programs?

5. What is the relationship between the faculty's skills with computers, WWW, and WCM tools and Web-based international education programs?

6. What is the relationship between age and Web-based distance education?

The data collected from Parts I to IV and Item 42 in Part VI, which was about age, answered the six research questions. The six research questions and Part V and Part VI of the questionnaire were related to the two purposes and the two problems of the study. The survey results of Part V, Items 41-48 were used to fulfill one of the purposes, to develop guidelines for a program in preparation for implementing Web-based distance education for the faculty members in Taiwan. Items 49 to 50 of Part V of the questionnaire were used to answer one of the research questions, to examine the readiness for offering certificates to seafarers via international education with countries who are members of the United Nations. Research Question 1 was used to answer the other research problem and purpose, which is about the attitudes of the faculty members of the two countries regarding Web-based instruction. The survey result of Research Questions 2 to 6 were used to establish the correlation among

dimensions of Part I to Part IV, to see if one dimension was related to another dimension. The correlation could be a reference for conducting a training program.

After interpreting the relation of the research problems and purposes to the research questions and the questionnaire, then, the next focus is about methodology, which includes the type of research and variables, research instrument and validity, population and sample, data collection, and data analysis.

Type of Research and Variables

The purpose of this study was to investigate the maritime technology faculty members' attitudes regarding Web-based distance instruction and international education programs, with the results of the study to be used as a reference and guideline for a faculty training program. Therefore the survey technique was used. Also, as noted in Chapter I, according to Fraenkel and Wallen (2000), it was common for researchers to examine "the relationship of responses to one question in a survey to another, or of a score based on one set of survey questions to a score based on another set" (p. 433), if this was the case, the techniques of correlational research were employed. Thus, in this study, the result of the survey was the base for correlational research. The dependent variable was the score calculated from faculty's responses to the statements on the questionnaire. As defined in this study, there are six selected independent variables utilized to explore the relationship among them. They were identified as (a) instructors' perspectives on educational technology, (b) attitudes regarding Web-based distance education, (c) perceptions of Web-based international education, (d) skills with computers, the Internet, World Wide Web (WWW), and Web Course Management (WCM) tools related to design, development,

and delivery of Web-based courses, (e) technology training program for faculty to develop Web-based courses, and (f) demographic information.

The above six independent variables were used to construct the contents of the questionnaire. The assumption behind this was that if the faculty members had a better capability to make use of various educational technologies, they were in a better position to embrace new ways to deliver knowledge. If this were the case, it would be easier for them to accept Web-based distance education conducted domestically. However, as seen in the review of literature, Web-based international education involves difficult issues such as cultural and linguistic barriers. The administrative issue is also included; thus, it might not easily be accepted by the faculty members in general. Despite those issues, collaboration in conducting Web-based international education has become a trend as many experts pointed out. As a result, there was a need to see if the faculty members of the five groups were open to this concept. If the faculty members were able to adopt Web-technology to deliver courses, then were they familiar with the relevant skills and WCM tools? If they were not and there should be a training program to prepare them to implement this technology. Finally, the demographic information was used to find the age, the years of services in the field, and other questions related to this study.

The above logical thinking was the foundation of the composition of the contents of this questionnaire. These independent variables combined with the research questions, as expected, contributed to fulfilling the research purposes and to solve the research problems of this study.

Research Instrument and Validity

The research instrument was divided into six parts. To comply with the correlational statistical technique, pairs of scores were correlated and the resulting correlation coefficient indicated the degree of relationship between the variables.

The six parts of the questionnaire (located in Appendix C) used to collect data were developed by the researcher based on the literature review, input from experts in the related area, and the researcher's course of study in the program. The questionnaire in Part I was designed to evaluate faculty's perspectives on educational technology. Part II was intended to investigate faculty's attitudes regarding Web-based distance programs conducted domestically, and Part III was used to understand faculty members' perceptions of Web-based international education programs. Part IV assessed the faculty members' skills with computers, the Internet, WWW, and WCM tools related to design, development, and delivery of Web-based courses. In each Part there were 10 statements. A Likert scale with five alternative choices was used for faculty members to circle the number that best describes their thoughts and opinions. The scale was 1 (strongly disagree), 2 (disagree), 3 (undecided), 4 (agree), and 5 (strongly agree). The scale 1, 2, 3, 4, and 5 represented 1 point, 2 points, 3 points, 4 points, and 5 points. Part V was used to assess training programs for faculty to deliver courses online. Part VI was demographic information.

After the questionnaire was developed from the literature review and the researcher's course of study, it was made available to experts in the related field for validation. After the questionnaire was validated by the experts, the final draft of the questionnaire was translated from English to Chinese (see Appendix D). In order to avoid ambiguity as well as misunderstanding resulting from language translation, four

native Chinese speakers were asked to verify the translated questionnaire. A pilot test was performed to test the validity in order to gain proper responses before the survey was formally conducted. Six faculty members in universities and colleges and eight faculty members in a vocational high school in Taiwan participated in the Chinese version pilot test. A faculty member at University of Northern Iowa (UNI) took part in the English version pilot test. According to the feedback from the respondents, the questionnaire was easily understood and required no further amending or correcting.

Sampling Method

Ary et al. (2000) stated, "In purposive sampling, also referred to as judgment sampling, sample elements judged to be typical, or representative, are chosen from the population" (p. 180). The purposive sampling was used to conduct this research in the study. The reason for using this sampling method was that maritime technology is a special field at the higher education level. In Taiwan, there are only two university level institutions. The population of this study consisted of all the faculty members from nine vocational high schools (n = 186), two junior colleges (n = 56), NKIMT National Kaohsiung Institute Marine Technology (NKIMT; n = 67), National Taiwan Ocean University (NTOU; n = 42), and Australian Maritime College (AMC; n = 25). The sources of the number of the faculty members were from the Web page of the Ministry of Education in Taiwan (http://www.edu.tw) and the Web-page of AMC (http://www.amc.au). Also as mentioned previously in the limitations, due to the fact that the maritime technology faculty need to deliver the online courses to vocational schools and to establish a partnership for the international program, the population was restricted to faculty in the department of maritime technology. Basically, in this study, the population in Taiwan included all faculty members.

Data Collection

The questionnaire survey technique was employed as the means to collect data for this study. Once the Chinese and English versions of the questionnaires were revised and approved and a pilot test was conducted, they were used to collect data. For the English version, only Part I, II, III, IV, and VI of the questionnaire was used to survey the faculty in AMC because the training program did not include AMC. In order to ensure that all the target samples were included and to facilitate a good return rate a mailing system was applied. Further, a coding system was applied in order to order and process the data. After the data was analyzed, it would be destroyed. It was an anonymous survey. The faculty at AMC was surveyed by email because of the overseas location. The questionnaire was hand delivered by the researcher to every faculty member at NKIMT due to being located in the same city. Additionally, the researcher delivered in person the questionnaire to faculty members at two vocational high schools situated a short distance from the location of the researcher.

The total sample consisted of 376 persons. The returned questionnaires numbered 239. However, 8 of these returned questionnaires were unusable for data analysis because of missing values on questions. There were no missing values for all 231 returned questionnaire. In the final accounting, each institution resulted in the amounts as follows: (a) nine vocational high schools, 109, (b) two junior colleges, 31, (c) NKIMT, 42, (d) NTOU, 38, and (e) AMC, 11, for an accumulated total of 231.

Data Analysis

After the survey was completed and the questionnaires were collected and organized, the data were analyzed by using these three statistical techniques, one way ANOVA, Pearson's product moment coefficient of correlation, and two-sample

Kolmogorov-Smirnov test (K-S test) in the software program, the Statistical Package for Social Science (SPSS).

Furthermore, the first four parts of the questionnaire are the instructor's perspectives on educational technology, attitudes regarding Web-based distance education, perceptions of Web-based international programs, as well as skills with computers, the Internet, WWW, and WCM tools related to design, development, and delivery of Web-based courses. In order to compare the differences and similarities among the five groups and to calculate the correlations among classified dimensions, each part of the questionnaire, based on the similarity in nature, was classified into several dimensions (see Appendix H).

One way ANOVA was applied to address Research Questions 1 and 6 to analyze the differences and similarities among the five groups regarding Web-based distance education and Web-based international distance education. One way ANOVA was used to interpret the data because more than two groups existed (Gravetter & Wallnau, 1999). The score added from each item was used to calculate the mean score. For the purpose of explanation, the researcher defined the mean scores as follows: weakly disagree (2.50-2.99), weakly agree (3.00-3.49), moderately agree (3.50-3.99), highly agree (4.00-4.49), and strongly agree (4.50-5.00). The mean score indicated the faculty members' attitudes regarding Web-based distance education and Web-based international programs. The higher the score, the higher the degree of accepting the technology mediated teaching and learning process. One-way ANOVA at level .05 ($\alpha = 0.05$) was then applied in order to compare the mean difference of each dimension to determine if there was a significant difference among the five groups. A Tukey Post Hoc test was performed to identify the location of the differences.

The second statistical technique used was correlational statistical analysis, Pearson's product moment coefficient of correlation. It was used to present research results because the amount of relationship between variables or attitude items can be interpreted efficiently (Oskamp, 1977). Research Questions 2 to 5 employed the statistical test to answer the correlations among the dimensions. The mean score of each dimension of each part of the questionnaire was calculated to establish their relationship by using the test statistic, Pearson's product moment coefficient of correlation. The level of significance (α) result was 0.05.

SPSS was used to calculate the correlation coefficients (r) and the significant level of variables. The correlation between the variables was expressed as Pearson's correlation coefficient (r). If the correlation coefficient was not zero, the correlation coefficient (r) and the significant level were reported. The correlation coefficient and its confidence level were used to interpret the nature and significance of the relationship between variables. Since the relationship between variables cannot be decided in advance, a two-tailed test at the 0.05 level needed to be conducted.

Correlations can be classified into two categories: positive and negative. In a positive correlation, the two variables tend to move in the same direction: When the X variable increases, the Y variable also increases; and if the X variable decreases, the Y variable also decreases. With a negative correlation, the two variables tend to go in opposite directions. When the X variable increases, the Y variable decreases. It becomes an inverse relationship. A correlation of 1.00 (or -1.00) indicates a perfectly consistent relationship. At the other extreme, a correlation of 0 indicates no relationship at all.

A more specific manner of interpretation of correlation coefficients (r), according to Gay and Airasian (2000), is that if a calculated r-value is below positive or negative .35, the relationship between variables is low or not related. If a calculated r-value is between positive or negative .35 and .65, it is moderately related. If a calculated r-value is higher than positive or negative .65, it is highly related.

Finally, the statistical test, Two-sample Kolmogorov-Smirnov test (K-S test), was used to determine if a consistency existed among the groups. It was used because this is a nonparametric test and the assumptions about the distribution was not made. Furthermore, the data were measured on a nominal scale (Gravetter & Wallnau, 1999). In order to fulfill the secondary purpose of this study: to develop guidelines for a program in preparation for implementing Web-based distance education, Part V of the questionnaire was designed to survey the faculty of maritime technology, nine vocational high schools, two junior colleges, NKIMT, and NTOU in Taiwan. In total, there were 220 valid responses. There were eight items in this part. For Items 41 to 43, only one choice could be checked. The responses were calculated and presented in the form of frequency and percentage.

For Items 44 to 48, more than one choice could be selected. The choices checked were cataloged by 1, 2, 3, 4, and 5 and calculated and presented in the form of frequency and percentage. A K-S test was used to determine if a consistency existed among the groups. For example, if under Item 44, choice number 3 was important to one group, and also important to the other three groups, there is a consistency which exists among the four groups which would facilitate training. Otherwise, individual group differences needed to be considered. The null hypothesis (H_0) stated that there is no difference among the four educational institutions. The

alternative hypothesis (H_1) stated that there is a difference between the four groups. SPSS was used to run the test result. If the level of significance ($\alpha = 0.05$) is lower than 0.05, then a difference would exist. Thus, we would then reject the null hypothesis. Otherwise, we fail to reject the null hypothesis which means that there is no difference among the four groups.

After running a K-S test to see if there is a consistency regarding the choices checked, the responses to each choice were calculated and presented in the form of frequency and percent. If the choices checked had the highest frequency, it meant that it was the choice every faculty member thought it was necessary and important. Thus, when preparing the training program, the choice with the highest frequency was the first consideration.

For Part VI of the questionnaire, demographic information, frequency distribution tables have been used to organize the distribution of the data. The questionnaire composed of six parts was used to collect data to answer six research questions which in turn correspond to the research problems and the research purposes. Research Question1 and 6 were answered by Part II, Part III, and Part VI of the questionnaire by applying one way ANOVA. Research Questions 2 to 5 were responded to by the combination of Part I to Part IV of the questionnaire by using Pearson's product moment coefficient of correlation. And Part V of the questionnaire was designed to implementing a training program. A K-S test was used to determine if a consistency existed among the groups.

To sum up this chapter, in addition to illustrating the relations of research problems, purposes, research questions of the study, and the logical thinking of the construction of the contents of the questionnaire, the focus was on the type of research

used, the composition of the questionnaire, the verification of the research instrument, the selection of samples, the collection of the data, and the statistical tests used to analyze the data. The concern of the next chapter is on data analysis.

CHAPTER IV

ANALYSIS OF THE DATA

This chapter presented the results of the statistical analyses of data gathered during this study. The findings for this study were derived from an analysis of the collected data. The following nine sections were included in this chapter. They were description of responses, demographic information, Research Question 1, Research Question 2, Research Question 3, Research Question 4, Research Question 5, Research Question 6, and finally the analysis of Part V of the questionnaire, training programs for faculty to deliver courses online.

Description of Responses

The first wave of mailing was comprised of 376 copies of the questionnaire. There were 351 of 376 copies of the questionnaire sent, mailed, or hand delivered to the target subjects in four educational institutions in Taiwan. There were 25 of 376 copies of the questionnaire sent by email to the faculty in Australian Maritime College (AMC). Responses were received from 187 of the subjects surveyed from Taiwan. Only 5 copies of the questionnaire were returned from AMC. Then a follow-up mailing which consisted of 184 copies of the questionnaire was mailed to the subjects who had not responded. Eleven of 184 copies of the questionnaire were sent by email to AMC. Another 41 subjects responded to the follow-up survey. There were 3 copies of the questionnaire from AMC. Due to the low return rate from AMC faculty, another follow-up mailing was sent by email to those non-respondents. An additional 3 instruments were returned. In total, there were 239 responses. The return rate was 63.5 %. However, 8 copies of the questionnaire were unusable for data analysis

because of missing values on questions. There were no missing values for all 231 returned questionnaires.

Demographic Information

The demographic data of participants in the five groups was composed of (a) schools (b) gender, (c) age, (d) years of service, (e) faculty rank, (f) education, and (g) miscellaneous which included questions regarding access to the Internet at home, using the Internet in class preparation, having an email account, and using computers for word processing.

Distribution of Schools

The questionnaire was mailed, sent, or hand delivered to teachers grouped by different levels of educational institutions. The composition of respondents consists of 47.2% (109/231) from 9 vocational high schools, 13.4% (31/231) from two junior colleges, 18.2% (42/231) from NKIMT, 16.5%(38/231) from NTOU, and 4.8% (11/231) from AMC.

Gender Distribution

The gender distribution of five groups was shown in Table 7. There was a great difference in number in the proportion of male and female faculty. It was found that in Taiwan very few females (18.2%) were in a teaching position in the maritime technology area.

Table 7

Gender

Gender	No.	%
Male	189	81.8%
Female	42	18.2%
Total	231	100%

Age Distribution

The age distribution was shown in Table 8. The majority of faculty members were between 31 and 50 years of age (52.4%). Therefore, most of them would be considered middle aged. However, faculty members below 30 years of age were 21.6%, which meant that there were quite a few young faculty members. Those above 51 amounted to 26% which exceeded the percentage of the under 30 group.

Table 8

Age

Age Grouping	No.	%
Under 30	50	21.6%
31-40	61	26.4%
41-50	60	26%
51-60	46	19.9%
Above 61	14	6.1%
Total	231	100%

Distribution of Years of Service

The number of years of teaching experience was displayed in Table 9. The table shows that the number of teachers who have taught less than five years was 21.6% while those between 6-10 years was 25.1%. These two groups nearly paralleled the age groupings in Table 8. The faculty teaching less than 10 years was 46.7%, and the groups beyond 21 years also were close to paralleling the age grouping in Table 8, of those beyond 51 years.

Table 9

Years of Services

Years of Services	No.	%
Under 5 years	50	21.6%
6-10 years	58	25.1%
11-20 years	64	27.7%
21-30 years	43	18.6%
Above 31 years	16	6.9%
Total	231	100%

Distribution of Faculty Rank

The distribution of faculty rank is displayed in Table 10. Among five categories, teachers who serve in high schools were 48.9 %. While those who serve above the high school level were over half, 51.1%.

Table 10

Faculty Rank

Faculty Rank	No.	%
Professor	43	18.6%
Associate Professor	29	12.6%
Assistant Professor	6	2.6%
Instructor	40	17.3%
Teacher	113	48.9%
Total	231	100%

Education

The level of education for the five groups was shown in Table 11. The majority of respondents held a Bachelor degree (45%), and 14 of them were also technicians with certificates. There were 29% of respondents who possessed a Master degree. There were 19.5% of participants who had earned a Doctorate. There were 3% of participants who had licenses issued from the government of Taiwan such as chief engineer licenses and pilot licenses and 3.5% belonged to other categories such as certificate, credential, and endorsement.

Table 11

Education Degree

Education Degree	No.	%
Bachelor	104	45%
Master	67	29%
Doctor	45	19.5%
License	7	3%
Others	8	3.5%
Total	231	100%

Miscellaneous

The answers to the other questions such as access to the Internet at home, using the Internet in class preparation, having an email account, and using computers for word processing were under the category of miscellaneous and displayed in Table 12. Up to 83.5% participants had access to the Internet at home, 83.1% had an email account, and 83.5% used computers for word processing. However, among them only 36.8% made use of the Internet in class participation. The statistical numbers showed that respondents were not used to taking advantage of this new Internet technology.

Table 12

Miscellaneous

	Yes		No	
Items	No.	%	No.	%
Access to the Web	193	83.5	38	16.5
Use the Internet for the Class Preparation	85	36.8	146	63.2
Email Account	192	83.1	39	16.9
Use Computers for Word Processing	193	83.5	38	16.5

The above analysis was about demographic information. The following sections will be about the analysis of the Research Questions 1 to 6 and the program training.

Research Question 1: Similarities and Differences in Attitudes

In this investigation, Research Question 1 was associated with the problem and the purpose of this study to evaluate the attitude of faculty members of two countries about adopting a distance education method. Part II and Part III of the questionnaire were designed to answer this question (see Appendix C). Research Question 1: what are the similarities and/or differences in attitudes and intentions regarding Web-based distance education and Web-based international education programs among the faculty at nine vocational high schools, two junior colleges, the two universities in Taiwan, and the faculty at AMC in Australia?

Analysis of Part II of the Questionnaire

As mentioned previously in Chapter III, to answer this question, Part II (Items 11-20) and Part III (Items 21-30) in the questionnaire were studied (see Appendix B).

There were 10 items in each part. The 10 items in Part II were categorized according to similarity in nature as four dimensions. These four dimensions were designated as F2A, F2B, F2C, and F2D. The content of F2A, F2B, F2C, and F2D were listed on Appendix H.

ANOVA was used to analyze how the school factors influence the dimensions of Web-based distance education. The means of the four dimensions of the 10 items on Part II of the questionnaire was displayed in Table 13. The result of ANOVA test was listed in Table 14.

Table 13

Means of the Four Dimensions

	F2A			F2B			F2C			F2D		
Groups	n	M	SD	n	M	SD	n	M	SD	n	M	SD
Voc High	109	3.31	.38	109	3.71	.67	109	3.96	.80	109	3.87	.98
College	31	3.35	.33	31	3.32	.66	31	4.22	.49	31	3.87	.76
NKIMT	42	3.34	.43	42	3.49	.90	42	4.09	.79	42	3.83	.85
NTOU	38	3.34	.32	38	3.46	.83	38	4.07	.74	38	3.71	1.01
AMC	11	3.16	.29	11	4.06	.55	11	4.27	.90	11	3.36	1.02
Total	231	3.32	.37	231	3.59	.76	231	4.05	.76	231	3.81	.93

Table 14

ANOVA Result of School Factors of the Four Dimensions of Web-based Distance Education

Dimensions	Groups	Sum of Squares	df	Mean Square	F	Sig.
F2A	Between Groups	.34	4	.08	.61	.65
	Within Groups	31.58	226	.140		
	Total	31.92	230			
F2B	Between Groups	7.28	4	1.82	3.27	*.01
	Within Groups	125.68	226	.56		
	Total	132.96	230			
F2C	Between Groups	2.43	4	.61	1.04	.38
	Within Groups	131.83	226	.58		
	Total	134.26	230			
F2D	Between Groups	3.11	4	.77	.88	.47
	Within Groups	199.88	226	.88		
	Total	202.99	230			

Note. * means significant at $\alpha = 0.05$.

Analysis

Table 13 indicates the total mean value of each dimension is F2A ($M = 3.32$), F2B ($M = 3.59$), F2C ($M = 4.05$), and F2D ($M = 3.81$). The range of means was from weakly agree to highly agree. Thus, it can be known that the faculty members of the five groups, in slightly differing degrees, had a consistent attitude regarding Web-based distance education.

As seen in Table 14, among the four dimensions, there were no significant differences among F2A, F2C, and F2D. However, F2B showed a statistically significant difference $F = 3.27$, at 0.05 level ($p = 0.01$). A Tukey Post Hoc showed that AMC was different from the other four groups. AMC placed more emphasis on

various ways to encourage faculty members to offer Web-based courses. F2B, including Items 18, 19, and 20, included the ways to encourage faculty members to offer Web-based courses either by additional compensation, or additional time, or support-staff assistance to prepare for distance learning classes.

Analysis of Part III of the Questionnaire

The 10 items in Part III of the questionnaire, as done in Part II, were analyzed to find differences and similarities and were categorized as F3A, F3B, and F3C (see Appendix H). ANOVA was used to analyze how the school factors influenced the dimensions of Web-based international distance education. The means of three dimensions of the 10 items on the Part III of the questionnaire were displayed in Table 15. The result of ANOVA test was displayed in Table 16.

Table 15

Means of the Three Dimensions

	F3A			F3B			F3C		
Groups	n	M	SD	n	M	SD	n	M	SD
Voc High	109	4.07	.45	109	3.86	.50	109	3.17	1.12
College	31	3.79	.51	31	3.96	.35	31	3.06	.89
NKIMT	42	3.82	.75	42	3.91	.53	42	2.90	1.14
NTOU	38	3.95	.47	38	3.74	.59	38	2.94	1.11
AMC	11	3.75	.44	11	3.63	.75	11	3.54	1.03
Total	231	3.95	.54	231	3.85	.52	231	3.09	1.09

Table 16

ANOVA Result of School Factors of the Four Dimensions of Web-based International Distance Education

Dimensions	Groups	Sum of Squares	df	Mean Square	F	Sig.
F3A	Between Groups	3.42	4	.85	2.99	*.01
	Within Groups	64.57	226	.28		
	Total	67.99	230			
F3B	Between Groups	1.52	4	.38	1.38	.24
	Within Groups	62.11	226	.27		
	Total	63.63	230			
F3C	Between Groups	5.29	4	1.32	1.10	.35
	Within Groups	269.80	226	1.19		
	Total	275.09	230			

Note. * means significant at $\alpha = 0.05$

Analysis

Table 15 indicates the total mean value of each dimension is F3A ($M = 3.95$), F3B ($M = 3.85$), and F3C ($M = 3.09$). The range of means was from weakly agree to moderately agree. Thus, it can be known that the faculty members of the five groups, to some different degree, had a consistent attitude regarding Web-based international distance education. However, for the F3C, which is Item 30 on Part III of the questionnaire (Many faculty members' jobs will disappear as recognized experts offer courses to thousands of students online), the mean value of NKIMT ($M = 2.90$) and NTOU ($M = 2.94$) are slightly below 3.00.

As seen in Table 16, among the three dimensions, there were no significant differences between F3B and F3C. However, F3A showed a statistically significant difference $F = 2.99$, at 0.05 level ($p = 0.01$). A Tukey Post Hoc showed that

vocational high schools were significantly different from the other four groups. The faculty members of vocational high schools paid more attention to F3A, (Web-based distance education can break national borders and students and faculty can work together). The items included in F3A can be seen in Appendix H.

Research Question1 concerned the faculty members' attitude regarding Web-based distance education and international education. It was analyzed with ANOVA statistical test. The mean value of each dimension was listed as well as the result of ANOVA test. For Web-based distance education, the mean value of each individual group is above 3.00. AMC was significantly different from the other four groups in the dimension F2B, which was about ways to encourage faculty to offer Web-based courses. For Web-based international distance education, the mean value of NKIMT and NTOU in F3C, the impact of Web-based distance education, was below 3.00. They were different from the other groups. For the result of ANOVA test, the faculty members of vocational high schools were significantly different from the others in the dimension of F3A.

Research Question 2: Technology and Distance Education

Research Questions 2 to 6, based on the results of the survey, were intended to investigate the correlations of Part I, Part II, Part III, Part IV, and age in Part VI of the questionnaire. The idea was derived from Fraenkel and Wallen (2000), who stated that it was common for researchers to examine "the relationship of responses to one question in a survey to another, or of a score based on one set of survey questions to a score based on another set" (p. 433). The basic assumption behind this research design was that if there was a correlation between dimensions of each part of the questionnaire, then the result of the correlational study could contribute to a better

understanding of faculty members' attitudes regarding Web-based distance education both domestically and internationally and this would assist in preparing a training program.

Research Question 2, what is the relationship between perspectives on educational technology and Web-based education, was designated to examine the correlation of educational technology and Web-based education. If the correlation coefficient was high, it could be concluded that the more familiarity with educational technology, the better their attitude would be about Web-based distance education.

To answer this research question, Items 01-10 (Part I) and Items 11-20 (Part II) were analyzed. There were 10 items in each part. The 10 items of Part I were categorized into three dimensions in order to analyze their relationships (see Appendix H). The result of correlation analysis was displayed in Table 17.

Table 17

Result of Correlation of Technology and Distance Education

Dimensions		F2A	F2B	F2C	F2D
F1A	Pearson Correlation	.27*	.15*	.23*	.19*
	Sig. (two-tailed)	.00	.02	.00	.00
	N	231	231	231	231
F1B	Pearson Correlation	.11	.01	.08	.02
	Sig. (two-tailed)	.09	.83	.21	.70
	N	231	231	231	231
F1C	Pearson Correlation	.21*	.08	.07	.01
	Sig. (two-tailed)	.00	.21	.23	.87
	N	231	231	231	231

Note * Correlation is significant at the 0.05 level (2-tailed).

Table 17 shows the relationship between the three dimension (F1A, F1B, and F1C) of Part I of the questionnaire (Instructors' Perspectives on Educational Technology) and the four dimensions (F2A, F2B, F2C, and F2D) of Part II of the questionnaire (Attitudes Regarding Web-based Distance Education).

Correlational analysis using the Pearson Product-Moment Coefficient of Correlation was performed to measure the relationship among the dimensions. As can be seen from Table 17, the results of a Pearson Correlation revealed that there was a significant relationship between these dimensions as the level of significance was set at .05. Reporting the results statistically: (a) F1A and F2A, $r = .27$, $N = 231$, and $p < .05$, (b) F1A and F2B, $r = .15$, $N = 231$, and $p < .05$, (c) F1A and F2C, $r = .23$, $N = 231$, and $p < .05$, (d) F1A and F2D, $r = .19$, $N = 231$, and $p < .05$, and (e) F1C and F2A, $r = .21$, $N = 231$, and $p < .05$.

Research Question 3: Technology and International Distance Education

Research Question 3, what is the relationship between perspectives on educational technology and Web-based international education programs, was specified to reveal the relationships between the dimensions of Part I and Part III of the questionnaire.

To answer this question, Items 01 through 10 (Part I) and Items 21 through 30 (Part III) of the questionnaire were analyzed. There were 10 items in each part. As done above in Research Question 2, the 10 items of Part I was categorized into three dimensions (F1A, F1B, and F1C) in order to analyze their relationships. The 10 items in Part III were also categorized as F3A, F3B, and F3C as in Research Question 1. The result of correlation analysis was presented in Table 18.

Table18

Result of Correlation of Technology and International Distance Education

Dimensions		F3A	F3B	F3C
F1A	Pearson Correlation	.36*	.00	.04
	Sig. (two-tailed)	.00	.97	.52
	N	231	231	231
F1B	Pearson Correlation	.33*	.10	.05
	Sig. (two-tailed)	.00	.12	.38
	N	231	231	231
F1C	Pearson Correlation	.19*	.12	.10
	Sig. (two-tailed)	.00	.05	.10
	N	231	231	231

Note * Correlation is significant at the 0.05 level (2-tailed).

Table 18 illustrated the relationship between the three dimensions (F1A, F1B, and F1C) of Part I of the questionnaire (Instructors' Perspective on Educational Technology) and the three dimensions (F3A, F3B, and F3C) of Part III of the questionnaire (Perceptions of Web-based International Education Programs).

Correlational analysis using the Pearson Product-Moment Coefficient of Correlation was performed to measure the relationship among the dimensions. As can be seen from Table 18, the results of a Pearson Correlation revealed that there was a significant relationship between these dimensions as the level of significance was set at .05. Reporting the results statistically: (a) F1A and F3A, $r = .36$, $N = 231$, and $p < .05$, (b) F1B and F3A, $r = .33$, $N = 231$, and $p < .05$, and (c) F1C and F3A, $r = .19$, $N = 231$, and $p < .05$.

Research Question 4: Web-based International Distance Education

The assumption of Research Question 4, what is the relationship between Web-based education and Web-based international education programs, was that if faculty members were willing to offer Web-based courses to students domestically they would have a better opinion of Web-based international education.

To answer this question, Part II (Items 11-20) and Part III (Items 21-30) of the questionnaire were studied. There were 10 items in each part. As done above in Research Question 1, Part II was categorized as the four variables F2A, F2B, F2C, and F2D. Part III was titled as F3A, F3B, and F3C. The contents of each variable are listed on Appendix II. The result of correlation analysis was displayed in Table 19.

Table 19

Result of Correlation of Web-based International Distance Education

Dimensions		F3A	F3B	F3C
F2A	Pearson Correlation	.18*	.01	.05
	Sig. (two-tailed)	.00	.77	.38
	N	231	231	231
F2B	Pearson Correlation	.37*	.02	.01
	Sig. (two-tailed)	.00	.69	.88
	N	231	231	231
F2C	Pearson Correlation	.11	.04	.00
	Sig. (two-tailed)	.08	.31	.98
	N	231	231	231
F2D	Pearson Correlation	.23*	.06	.11
	Sig. (two-tailed)	.00	.35	.07
	N	231	231	231

Note * Correlation is significant at the 0.05 level (2-tailed).

Table 19 shows the relationship between the four dimensions (F2A, F2B, F2C, and F2D) of Part II of the questionnaire (Attitudes regarding Web-based Distance Education) and the three dimensions (F3A, F3B, and F3C) of Part III of the questionnaire (Perceptions of the Web-based International Education).

Correlational analysis using the Pearson Product-Moment Coefficient of Correlation was performed to measure the relationship among the dimensions. As can be seen from Table 19, the results of a Pearson Correlation revealed that there was a significant relationship between these dimensions as the level of significance was set at .05. Reporting the results statistically: (a) F2A and F3A, $\underline{r} = .18$, $\underline{N} = 231$, and $\underline{p} < .05$, (b) F2B and F3A, $\underline{r} = .37$, $\underline{N} = 231$, and $\underline{p} < .05$, and (c) F2D and F3A, $\underline{r} = .23$, $\underline{N} = 231$, and $\underline{p} < .05$.

Research Question 5: Skills and Web-based International Education

The assumption in Research Question 5, what is the relationship between the faculty's skills with computers, World Wide Web (WWW), and Web Course Management (WCM) tools related to design, development, and delivery of Web-based course and Web-based international education programs was that if faculty members were familiar with the application of the Internet, the Web, and the WCM tools, they would want to conduct courses online across national boundaries. Thus, this in turn has to do with faculty members' attitudes.

To answer this research question, Items 31-40 on Part IV of the questionnaire and Items 21-30 on Part III of the questionnaire were analyzed. There were 10 items in each part. Part III was titled as F3A, F3B, and F3C as done on Research Question 3. Part IV was designated as F4A, F4B, and F4C. The result of correlation analysis was displayed in Table 20.

Table 20

Result of Correlation of Skills and Web-based International Education

Dimensions		F4A	F4B	F4C
F3A	Pearson Correlation	.18*	.19*	.04
	Sig. (two-tailed)	.00	.00	.48
	N	231	231	231
F3B	Pearson Correlation	.01	.03	.10
	Sig. (two-tailed)	.84	.56	.11
	N	231	231	231
F3C	Pearson Correlation	.10	.08	.12
	Sig. (two-tailed)	.11	.22	.06
	N	231	231	231

Note * Correlation is significant at the 0.05 level (2-tailed).

Table 20 displayed the relationship between the three dimensions (F3A, F3B, and F3C) of Part III of the questionnaire (Perceptions of Web-based International Education Programs) and the three dimensions (F4A, F4B, and F4C) of Part IV of the questionnaire (Skills with Computers, WWW, and WCM tools).

Correlational analysis using the Pearson Product-Moment Coefficient of Correlation was performed to measure the relationship among the dimensions. As can be seen from Table 20, the results of a Pearson Correlation revealed that there was a significant relationship between these dimensions as the level of significance was set at .05. Reporting the results statistically: F3A and F4A, $r = .18$, $N = 231$, and $p < .05$ and F3A and F4B, $r = .19$, $N = 231$, and $p < .05$.

Research Question 6: Age and Web-based Distance Education

This research question, what is the relationship between age and Web-based distance education, was specified to investigate if age is a factor having impact on the

intentions of the faculty members to adopt new technology to deliver knowledge and skills to learners at a distance. One-way ANOVA was applied to answer this question.

To answer this question, Item 52, Part VI of the questionnaire and Items 11 to 20 of Part II of the questionnaire were analyzed. As done in Research Question 1, 10 items in Part II were categorized according to similarity in nature as four dimensions. These four variables were coded as F2A, F2B, F2C, and F2D. The contents of each dimension were listed in Appendix H.

ANOVA was used to analyze how age factors influenced the dimensions of Web-based distance education. There were five age groups, which included age below 30, age between 31 and 40, age between 41 and 50, age between 51 and 60, and age above 61. The means of the four dimensions of the 10 items on Part II of the questionnaire were displayed in Table 21. The result of ANOVA test was in Table 22.

Table 21

Means of the Four Dimensions

	F2A			F2B			F2C			F2D		
Age	n	M	SD	n	M	SD	n	M	SD	n	M	SD
Below 30	50	3.36	.32	50	3.46	.71	50	4.06	.68	50	3.92	.80
31-40	61	3.29	.39	61	3.61	.71	61	3.96	.83	61	3.83	.98
41-50	60	3.29	.41	60	3.83	.68	60	4.18	.70	60	3.88	.88
51-60	46	3.40	.34	46	3.50	.84	46	4.10	.76	46	3.52	1.07
Above 61	14	3.27	.36	14	3.23	.91	14	3.71	.91	14	4.00	.87

Table 22

ANOVA Result of Age Factors to the Four Dimensions of Web-based Distance Education

Dimensions	Groups	Sum of Squares	df	Mean Square	F	Sig.
F2A	Between Groups	.59	4	.15	1.08	.36
	Within Groups	31.33	226	.13		
	Total	31.92	330			
F2B	Between Groups	6.64	4	1.66	2.97	*.02
	Within Groups	126.30	226	.55		
	Total	132.95	230			
F2C	Between Groups	3.21	4	.80	1.38	.239
	Within Groups	131.05	226	.58		
	Total	134.26	230			
F2D	Between Groups	5.29	4	1.32	1.51	.19
	Within Groups	197.70	226	.87		
	Total	202.99	230			

Note. * means significant at $\alpha = 0.05$

Analysis

Table 21 indicates the total mean value of each dimension is F2A ($M = 3.32$), F2B ($M = 3.59$), F2C ($M = 4.05$), and F2D ($M = 3.81$). The range of means was from weakly agree to highly agree. Thus, it can be known that the faculty members of the five groups, in slightly differing degrees, had a consistent attitude regarding Web-based distance education regardless of an age factor.

As seen in Table 22, among the four dimensions, there are no significant differences among F2A, F2C, and F2D. However, F2B shows a statistically

significant difference F = 2.97, at 0.05 level (p = 0.02). A Tukey Post Hoc shows that two age groups, above 61 and 41-50, were different from the other three groups. The mean of age above 61 has the lowest mean (M = 3.23) whereas the mean of age between 41-50 has the highest mean (M = 3.83). It can be interpreted that those between the age of 41-50 gave more attention to various ways to encourage faculty members to offer Web-based courses.

Analysis of Part V of the Questionnaire: A Training Program

Part V of the questionnaire is about training programs for faculty to deliver courses online. This section was to fulfill the second purpose of the study, to develop guidelines for a program in preparation for implementing Web-based distance education for the faculty members in Taiwan.

Items 41 to 43 are about the ways, time period, and location for conducting a training program. Only one choice can be marked. Item 41 is about ways of conducting a training program. The data analyzed was listed as Table 23. Hands-on workshop was the first choice.

Table 23

Frequency of Each Choice Checked on Item 41: Ways

	Voc High		College		NKIMT		NTOU		Total	
Choice	n	%	n	%	n	%	n	%	n	%
1. seminars or conferences	13	12%	8	26%	11	26%	7	19%	39	18%
2. hands-on workshop	50	46%	12	39%	20	48%	14	37%	96	43%
3. self-paced learning via CD	25	23%	5	16%	7	17%	6	16%	43	20%
4. one-on-one instruction	21	19%	6	19%	4	9%	11	29%	42	19%
Total	109	100%	31	100%	42	100%	38	100%	220	100%

Item 42 is about the time period for conducting a training program. The data analyzed were listed as Table 24. Summertime was the first choice for conducting a training program.

Table 24

Frequency of Each Choice Checked on Item 42: Time Period

	Voc High		College		NKIMT		NTOU		Total	
Choice	n	%	n	%	n	%	n	%	n	%
1. Summer	81	74%	18	58%	29	69%	24	63%	152	69%
2. Weekdays	16	15%	10	32%	7	17%	9	24%	42	19%
3.Weekends	12	11%	3	10%	6	14%	5	13%	26	12%
Total	109	100%	31	100%	42	100%	38	100%	220	100%

Item 43 is about the location for conducting a training program. The data analyzed was listed as Table 25. Campus site was the first choice for conducting a training program.

Table 25

Frequency of Each Choice Checked on Item 43: Location

Choice	Voc High		College		NKIMT		NTOU		Total	
	n	%	n	%	n	%	n	%	n	%
1. Campus site	78	72%	18	58%	36	86%	35	92%	167	76%
2. External campus site	31	28%	13	42%	6	14%	3	8%	53	24%
Total	109	100%	31	100%	42	100%	38	100%	220	100%

Items 44 to 48 of Part V of the questionnaire are about the contents of a training program. The respondents were asked to check as many choices as they would need to conduct a Web-based course. The choices were cataloged by 1, 2, 3, 4, and 5 and calculated and presented in the form of frequency and percent. As mentioned above in Chapter III, K-S test was used to examine if there was a consistency regarding various choices checked. The result shows that there is no difference regarding choices checked from Items 44 to 48 (see Appendix I). The table displays the fact that the four groups have consistency about the choices marked. The result shows that there was no difference regarding choices checked. Frequency and percent tables were used to display the choices checked to see the priority of the choices.

Item 44 is about Web page design and creation, which has five choices. Table 26 shows that choice 3, uploading to a Web server is the most important one; then comes choice 4, creating the Web page using HTML.

Table 26

Frequency of Choices Checked on Item 44: Web Page Design

	Voc High		College		NKIMT		NTOU		Total	
Choice	n	%	n	%	n	%	n	%	n	%
1. Introduction to HTML	65	18%	13	17%	18	15%	21	19%	117	17%
2. Adding multimedia on the Web	70	19%	13	17%	17	14%	17	15%	117	17%
3. Uploading to a Web server	86	24%	22	29%	32	27%	24	22%	164	25%
4. Creating Web pages using HTML	73	20%	13	17%	27	23%	24	22%	128	19%
5. Creating Web pages using editing software	70	19%	16	20%	26	22%	24	22%	136	21%
Total	364	100%	77	100%	120	100%	110	100%	662	100%

Item 45 is about multimedia techniques on the Web I, which has five choices. Table 27 shows the frequency and percent of each choice checked. Choice 3, creating Web animation is the most important one; then comes choice 2, recording and editing sounds and music.

Table 27

Frequency of Choices Checked on Item 45: Techniques I

	Voc High		College		NKIMT		NTOU		Total	
Choice	n	%	n	%	n	%	n	%	n	%
1. Creating and editing graphics	70	18%	17	20%	25	20%	24	22%	136	19%
2. Recording & editing sounds & music	89	23%	19	23%	27	21%	23	21%	158	22%
3. Creating Web Animation	87	22%	19	23%	30	23%	24	22%	160	23%
4. Creating and editing a video file	85	21%	17	20%	26	20%	22	20%	150	21%
5. Creating and editing text	64	16%	9	11%	20	16%	17	15%	110	15%
Total	395	100%	81	100%	128	100%	110	100%	714	100%

Item 46 is about multimedia techniques on the Web II, which has three choices. Table 28 shows the frequency and percent of each choice checked. Choice 2, converting a presentation file to a Web page is the most important one; then comes choice 3, using multimedia products (e.g. digital camera, digital video camera).

Table 28

Frequency of Choices Checked on Item 46: Techniques II

	Voc High		College		NKIMT		NTOU		Total	
Choice	n	%	n	%	n	%	n	%	n	%
1. Compressing files	72	29%	17	33%	23	28%	23	30%	135	29%
2. Converting presentation files to Web page	89	36%	18	35%	30	37%	30	39%	167	36%
3. Using multimedia products	89	36%	17	33%	29	35%	24	31%	159	34%
Total	250	100%	52	100%	82	100%	77	100%	461	100%

Item 47 is about Web Course Management (WCM) tools, which has five choices. Table 29 shows the frequency and percent of each choice checked. Choice 4, course component is the most important one; then comes choice 2 and 3, concepts of e-learning and course utilities.

Table 29

Frequency of Choices Checked of Item 47: WCM Tools

	Voc High		College		NKIMT		NTOU		Total	
Choice	n	%	n	%	n	%	n	%	n	%
1. Introduction to WCM tools	84	21%	19	20%	27	20%	26	19%	156	20%
2. Introduction to the concepts of e-learning hub	80	20%	18	20%	33	24%	27	20%	158	20%
3. Course utilities	82	20%	21	22%	27	20%	28	21%	158	20%
4. Course components	84	21%	22	23%	27	20%	27	20%	160	21%
5. Course tools	78	19%	15	16%	23	17%	27	20%	143	18%
Total	408	100%	95	100%	137	100%	135	100%	775	100%

Item 48 is about additional software tools, which has four sub-items. Table 30 shows the frequency and percent of each choice checked. Choice 4, databases is the most important one; then comes choice 2, presentation software.

Table 30

Frequency of Choices Checked on Item 48: Additional Tools

	Voc High		College		NKIMT		NTOU		Total	
Choice	n	%	n	%	n	%	n	%	n	%
1. Word processing	45	18%	19	37%	21	24%	18	24%	103	22%
2. Presentation software	70	28%	13	25%	28	32%	24	32%	135	29%
3. Spreadsheet	48	19%	4	8%	13	15%	16	21%	81	17%
4. Databases	88	35%	16	31%	25	29%	18	24%	147	32%
Total	251	100%	52	100%	87	100%	76	100%	466	100%

Items 49 and 50 were related to the research problem, which was about the willingness of the faculty members in Taiwan to assist seafarers in Taiwan to get certificates from the nations who are the members of United Nations through Web-based international instruction. The results were displayed in Table 31 and 32. The mean of the degree of familiarity with the rules and regulations of STCW'95 was much above 3 (M = 4.11). The mean of the degree of willingness to help seafarers in Taiwan to get certificates via Web-based instructional was also much above 3 (M = 3.50).

Table 31

Mean Score of Items 49 and 50: Familiarity and Certificates

Items	n	M	SD
Item 49: Familiarity	220	4.11	.43
Item 50: Certificates	220	3.50	.82

Table 32

Frequency of Items 49 and 50: Familiarity and Certificates

Items	Check Number	Frequency	Percent
Item 49: Familiarity	3	9	4.1
	4	177	80.5
	5	34	15.5
Item 50: Certificates	1	2	.9
	2	24	10.9
	3	73	33.2
	4	104	47.3
	5	17	7.7

Note. 1 = strongly disagree, 2 = disagree, 3 = undecided, 4 = agree, 5 = strongly agree

Summary of Chapter IV

Chapter IV was written to analyze the data collected from the survey. Research Questions 1 and 6 were examined by ANOVA test whereas Research Questions 2 to 5 were analyzed by the Pearson Correlation test. K-S test was used to compare the consistency of each choice marked by the four groups from Items 41 to 48 of Part V

of the questionnaire. Items 49 and 50 of Part V of the questionnaire were presented in the form of frequency and percent. The interpretation of the data analyzed was the focus of the next chapter.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The four major sections of this final chapter include summarizing the study, summarizing the findings presented in the previous chapter of this study, drawing conclusions based on the findings, and offering recommendations for future study.

Summary of Study

Although Web-based distance education was encouraged and facilitated by the Government of Taiwan as reviewed in Chapter II, the attitudes of the faculty members in the field of Maritime technology was not known. This study was the beginning of research to investigate the attitudes of the issues in this field. Thus, the first research problem was used to reveal the attitudes of the faculty members of this field. The second research problem was to examine the readiness of the faculty members to assist seafarers in Taiwan to receive certificates issued by the members of United Nations via Web-based international programs. This problem came from the new rule of STCW'95 that "Certificates issued by or under the authority of a NON-PARTY shall not be recognized" (IMO White List), as mentioned previously in Chapter I. Because of these two problems this study was conducted to achieve two purposes. The prime purpose was to identify and determine faculty attitudes and intentions about adopting distance educational methodology. A secondary purpose was to develop guidelines for a program in preparation for implementing Web-based distance education for the faculty members in Taiwan. If the results of this study showed that the faculty had positive attitudes and intentions to design, develop, and deliver courses online, then the findings would be a source of information for relevant decision making by policy makers. Furthermore, the information from the questions

about the training programs for faculty to deliver courses online can be used as reference for conducting training courses to meet their needs regarding computer skills, network skills, and applications in offering online courses.

The following research questions were developed to guide the investigation of this study:

1. What are the similarities and/or differences in attitudes and intentions regarding Web-based distance education and Web-based international education programs among the faculty at nine vocational high schools, two junior colleges, the two universities in Taiwan, and the faculty at AMC in Australia?

2. What is the relationship between perspectives on educational technology and Web-based education?

3. What is the relationship between perspectives on educational technology and Web-based international education programs?

4. What is the relationship between the Web-based distance education and the Web-based international education programs?

5. What is the relationship between the faculty's skills with computers, WWW, and WCM tools and Web-based international education programs?

6. What is the relationship between age and Web-based distance education?

Sample

The sample consisted of the faculty of maritime technology in nine vocational high schools, two junior colleges, and two universities in Taiwan and the faculty from the Department of Marine Technology in Australia. A total of 63.5% of the respondents returned the survey instrument developed for this study.

Statistical Test

Three statistical tests were conducted at the .05 level of significance to analyze data collected to answer the six research questions. One-way ANOVA was used to answer Research Questions 1 and 6. Correlational statistic analysis was conducted to answer Research Questions 2 to 5. A two-sample K-S test was performed to determine if there was a consistency exhibited among the four groups regarding the items they chose. Frequency distribution tables were used to organize demographic information. The responses to every question were processed to produce the mean score and to make a comparison among the five groups.

Summary of Findings

ANOVA Test

Research Questions 1 and 6 were analyzed by one way ANOVA test. The findings were listed as follows.

Research Question 1. Research Question 1 sought to reveal the similarities and differences of the faculty members' attitudes of the five groups regarding Web-based distance education and international programs. Part II of the questionnaire, Attitudes Regarding Web-based Distance Education, was employed to answer the discrepancy of attitudes about Web-based distance education. Although the total mean value of each dimension was above 3 of the Likert scale, the faculty members of AMC had the highest mean value ($\underline{M}$ = 4.06). A Tukey Post Hoc test showed that AMC was significantly different from the other four groups in the dimension of the ways to encourage faculty members to offer Web-based courses. This dimension included additional compensation, additional time, and support-staff for teaching a distance class.

Part III of the questionnaire, Perceptions of Web-based International Education Programs, was used to differentiate the attitudes of the five groups in relation to the Web-based international education. Dimension F3C regards the threat to the faculty members teaching positions due to well-known experts offering Web-based course to thousands of students around the world. For this, the mean value of AMC ($\underline{M}$ = 3.54) was the highest whereas the mean value of both NKIMT ($\underline{M}$ = 2.90) and NTOU ($\underline{M}$ = 2.94) were the lowest. A Tukey Post Hoc test showed that vocational high schools ($\underline{M}$ = 4.07) were significantly different from the other four groups in the dimension, F3A. F3A, which included Items 21, 22, 26, 27, 28, and 29 (see Appendix H), which was about the advantages of Web-based international education.

Research Question 6. According to the literature review, age factors might be an obstacle to faculty members in making good use of Internet technology. This research question sought to confirm if it was an impediment for the faculty members of the five groups and to verify the assumption listed in Chapter I, the younger the faculty members, the better they are able to take advantage of Web-based teaching and learning. The answer of this question could also contribute to the understanding of the faculty members' attitudes.

From the interactive analysis of the age factor, which is Item 52 on Part VI, and Part II of the questionnaire, the mean values (from $\underline{M}$ = 3.32 to $\underline{M}$ = 4.05) of each individual dimension of Part II revealed that age factor was not a concern for the willingness of the faculty members of the five groups to adopt new educational technology to deliver the courses online. ANOVA test showed that the age group above 61 had the lowest mean ($\underline{M}$ = 3.23) and the age group between 41-50 had the highest mean ($\underline{M}$ = 3.83) which were significantly different from the other three

groups in the dimension about the ways to encourage the faculty members to offer courses online.

Pearson Correlation

Research Questions 2 to 5 were analyzed with the Pearson Correlation test. The findings were presented as follows.

Research Question 2. This question was used to see if there exists a relationship between the dimensions of Part I (Instructors' Perspectives on Educational Technology) and Part II (Attitudes Regarding Web-based Distance Education) of the questionnaire. The result of Pearson correlation analysis showed that making good use of educational technology to improve students learning attitudes and results (F1A) was significantly related to the faculty members' attitudes regarding teaching by the Web (F2A; r = .27), the ways to encourage faculty members to offer Web-based course (F2B; r = .15), copyright (F2C; r = .23), and getting educational degrees (F2D; r = .19). Also, using educational technology to organize and share information effectively and conveniently (F1C) was significantly related to faculty members' attitudes regarding teaching by the Web (F2A; r = .21).

Research Question 3. This question was used to see if there exists a relationship between the dimensions of Part I (Instructors' Perspectives on Educational Technology) and Part III (Perceptions of Web-based International Education) of the questionnaire. The result of Pearson correlation analysis showed that the advantages of Web-based international education (F3A) was significantly related to making good use of educational technology to improve students learning attitudes and results (F1A; r = .36), curriculum design (F1B; r = .33), and using educational technology to organize and share information effectively and conveniently (F1C; r = .19).

Research Question 4. This question was used to see if there exists a relationship between the dimensions of Part II (Attitudes Regarding Web-based Distance Education) and Part III (Perceptions of the Web-based International Education) of the questionnaire. The result of Pearson correlation analysis showed that the advantages of the Web-based international education programs (F3A) was significantly related to faculty's attitudes regarding teaching by the Web (F2A; r = .18), the ways to encourage faculty members to offer the Web-based courses (F2B; r = .37), and getting educational degree (F2D; r = .23).

Research Question 5. This question was used to see if there is a relationship between the dimensions of Part IV (Skills with Computers, the Internet, WWW, and WCM tools) and Part III (Perceptions of the Web-based International Programs) of the questionnaire. The result of the Pearson correlation analysis showed that the advantages of Web-based international education (F3A) were significantly related to computer skills (F4A; r = .18) and network skills (F4B; r = .19).

Items 41 to 43

The choices of the faculty on Item 41 (ways of conducting a training program) was hands-on workshop (43%), self-paced learning via CD (20%), one-on-one instruction (19%), and seminars or conferences (18%). The choices of the faculty on Item 42 (time period for conducting a training program) was summer (69%), weekdays (19%), and weekends (12%). The priority of Item 43 (location for conducting a training program) was campus site (76%) and external campus site (24%).

Two-sample Kolmogorov-Smirnov

Items 44 to 48. The K-S test found that no difference existed among the four groups although the choices marked were not the same. The result of the K-S test was located in Appendix L. The results of every individual choice of each item was found. The results of Item 44 (Web page design and creation) is uploading to a Web server (25%), creating Web pages using editing software (21%), creating Web pages using HTML (19%), adding multimedia on the Web (17%), and introduction to HTML (17%). The priority of Item 45 (multimedia techniques on the Web I) is creating Web animation (23%), recording and editing sounds and music (22%), creating and editing a video file (21%), creating and editing graphics (19%), and creating and editing text (15%). The results of Item 46 (multimedia techniques on the Web I) is converting presentation files to a Web page (36%), using multimedia products (34%), and compressing files (29%). The results of Item 47 (WCM tools) is (a) course components including course homepage, syllabus, and content module (21%), (b) introduction to WCM tools (e.g., WebCT, Blackboard, TopClass, and Convene; 20%), (c) introduction to concepts (e.g., the e-Learning Hub, e-Learning resources packs), and their features used to create entire courses online or to complement a classroom-based course (20%), (d) course utilities including course builder, designer map, course appearance, managing students, managing files, content assistant, language, and resume course (20%), and (e) course tools including assignments, calendar, communication, and quiz and survey (18%). The results of Item 48 (additional software tools) was databases (32%), presentation software (29%), word processing (22%), and spreadsheet (17%).

Items 49 to 50

Item 49 (M = 4.11) is about the familiarity with the rules and regulations of STCW'95. The mean is high in that all the faculty members are professional experts in the field. The importance of thorough knowledge of STCW'95 to the faculty members is like instructors in driving schools to learners of driving. Driving instructors must know traffic rules and driving skills in order to instruct learners of driving. Without drivers' licenses, drivers are not allowed to drive; without certificates issued by IMO, seafarers are prohibited from working in the field.

Item 50 (M = 3.50) is about the degree of interest of instructors to assist seafarers in Taiwan to acquire certificates through Web-based international education from the nations who are members of IMO. The result of Item 49 gave a background understanding of the high mean score of Item 50. The results on Item 50 can be interpreted as the faculty members hold a positive attitude to this statement. In fact, one of the career goals of seafarers is to acquire certificates so that they are able to work in the field. Thus, the faculty members have an obligation to assist seafarers or students to gain certificates via various ways. Furthermore, if seafarers and students want promotion to the higher level positions, such as a promotion from engineer to first engineer to chief engineer, they must take training courses via distance education to study the theoretical aspects of their jobs. Countries like Norway, the United Kingdoms, and Singapore already have distance-learning programs for this purpose (S. Y. Hu, personal communication, July 14, 2000).

Conclusions Related to My Research

This study solved the research problems, fulfilled the research purposes, and answered the research questions. The interpretations of the data and resulting statistical tests were noted in the following passages.

Primary Research Problem and Primary Research Purpose

The primary research problem was to establish faculty attitudes regarding a distance education instructional program for maritime technology institutions in two seafaring countries. As these attitudes were not known, the primary purpose of this study was to identify and determine their attitudes and intentions about adopting distance educational methodology.

Based on the results of the data collected and analyzed, it was concluded that the faculty members of the five groups held a positive attitude toward Web-based distance education and international programs. The means of the three dimensions of Part I, the four dimensions of Part II, and the three dimensions of Part III, as listed above, supported this conclusion. Also, the total means of Part II and Part III of the questionnaire support this conclusion, too. When the mean score was calculated holistically without dividing into various dimensions, the average mean scores of Part II ($\underline{M}$ = 3.8) and Part III ($\underline{M}$ = 4.2) fell into the category of moderately agree (3.50-3.99) and highly agree (4.00-4.49).

Second Research Problem

The other research problem was to examine the readiness for offering certificates to seafarers via international education with countries who are members of the United Nations. Item 49 ($\underline{M}$ = 4.2) and Item 50 ($\underline{M}$ = 3.5) of Part V of the questionnaire addressed this problem. It was concluded that the faculty members in the four

educational institutions in Taiwan were ready and willing to assist seafarers to gain certificates issued by members of IMO via Web-based international education.

Second Research Purpose

The other research purpose was to develop guidelines for a program in preparation for implementing Web-based distance education to the faculty members in Taiwan. Part V of the questionnaire was designed to satisfy this purpose. Two conclusions were made. One was that for Items 41 to 43, a hands-on workshop training program conducted during summer break on campus was the first choice of the faculty of the four educational institutions. The other conclusion, regarding Items 44 to 48, was that the result of K-S test showed that there was no discrepancy about the choices checked; thus, when conducting a training program, every group can be trained in the same way without considering individual group difference in the choices made.

Conclusions to Research Questions 1 and 6

As regards Web-based distance education, from the data analyzed, it was concluded that the five groups of the faculty members had a consistent attitude (the mean was above 3 of the Likert scale) to this issue with the faculty of AMC emphasizing more the various ways to encourage faculty members to offer Web-based courses.

On the Web-based international education part, it was concluded that the five groups of the faculty members had certain inconsistent attitudes toward the issue investigated, although the total mean was above 3 of the Likert scale. The faculty of NKIMT ($\underline{M}$ = 2.90) and NTOU ($\underline{M}$ = 2.94) did not agree that internationally famous experts' offering Web-based courses to thousands of international students could

cause an impact to faculty members' teaching positions. However, it was a concern for the faculty members of AMC ($\underline{M}$ = 3.54).

For the question about the age factor being related to the willingness of the faculty members to adopt new ways to deliver knowledge and skills to learners, it was concluded that age had nothing to do with the attitudes of the faculty members of the five groups ($\underline{M}$ = 3.32 to $\underline{M}$ = 4.05).

Conclusions to Research Questions 2 to 5

Based on the interpretation of correlation coefficients, mentioned in Chapter III, if a calculated $\underline{r}$-value is below positive or negative .35, the relationship between variables is low or not related. If a calculated $\underline{r}$-value is between positive or negative .35 and .65, it is moderately related. If a calculated $\underline{r}$-value is higher than positive or negative .65, it is highly related. The results of all correlation coefficients were below .35. Thus, it was concluded that there was a low or not related correlation among the dimensions except for the dimensions F3A, F2B, and F1A. The advantages of Web-based international education was significantly related to making use of educational technology to improve students learning attitudes and results ($\underline{r}$ = .36; $\underline{N}$ = 231; $\underline{p} < .05$ level) and the ways to encourage faculty members to offer Web-based courses ($\underline{r}$ = .37; $\underline{N}$ = 231; $\underline{p} < .05$ level).

Recommendations

This section was divided into two parts: recommendations based on the study and recommendations for future study.

Recommendations Based on the Study

Based on the findings and conclusions of this study, the following recommendations were formulated by the researcher:

1. It was recommended that faculty members be encouraged to offer Web-based courses by additional compensation, additional time, or support-staff assistance.

2. It was recommended that the Ministry of Education think positively about supporting the marine institutions by setting up an educational training center on each campus to offer training courses periodically and systematically to help faculty to deliver courses online. If this were not the case, at least, training programs should be scheduled a couple times a year for the availability of the faculty members.

3. It was recommended that when conducting the training program for implementing Web-based distance education, it is better to have it on campus during the summer and that it should be a hands-on workshop. The priority choices made on each item should be the first consideration if time and money were constrained.

4. It was recommended that Web-based courses could be offered to students on campus with the help of the administration of each institution. This would get students and faculty members involved and used to the new pattern of learning and teaching since the results showed that the faculty members showed the intentions and interests.

5. It was recommended that since the faculty members of nine vocational high schools showed enthusiasm about taking advantage of Web-based international education programs, the Ministry of Education could encourage and assist them to get in touch online with the faculty members in the field in other countries to communicate and exchange knowledge and skills without leaving home.

6. It was recommended that since Web-based international education will be a trend in years to follow and because it would not be good to get behind, the faculty

members at NKIMT and NTOU need to begin familiarizing themselves with the relevant issues of internationalism in higher education.

7. It was recommended that since Taiwan is not a member of the United Nations, in addition to assisting seafarers to gain certificates issued by the IMO through the Web-based distance education, other entities can also make use of the advantages of the Web to get necessary information and training.

8. It was recommended that the educational officers who are in charge of Web-based distance education should support the continuous investigation of the attitudes of the faculty members in various fields and in different levels of educational institutions to ascertain their intentions in conducting courses online. The collaboration of government policy making and the participation of the faculty are critical to the success of a Web-based educational environment in Taiwan.

Recommendations for the Future Study

This study was limited to the investigation of the faculty members in the field of marine technology education. More studies are needed in order to know the intentions and interests of faculty members to deliver courses online in various fields. When relevant studies are conducted, the following recommendations can be considered.

1. The research design and procedures of this study can be duplicated to verify the results in other fields.

2. Someone could use this research instrument to do the whole study on his or her own to test the questionnaire and verify it.

3. In order to increase the inter consistency reliability of grouping of dimensions, the statistical procedures of Cronbach's alpha (α) and factor analysis should be employed.

4. Replicate this study to the students of higher education to know their intentions regarding Web-based distance education and Web-based international education.

5. The Web-based international program between AMC and NKIMT is going to be implemented and a follow-up is necessary.

6. It is expected that the number of educational programs conducted across country borders will be increasing. Future studies could focus on the development of administrative issues, cultural diversity, and linguistic barriers.

REFERENCES

Ary, D., Jacobs, L. C., & Razavieh, A. (2000). Introduction to research in education (5th ed.). Orlando, FL: Holt, Rinehart and Winston, Inc.

Badham, R., & Mathews, J. (1989). The new production systems debate. Labour and Industry, 2(2), 194-246.

Bates, T. (1984). The growth of technology in distance education. In A.W. Bates (Ed.), The role of technology in distance education (pp. 53- 69). New York: St. Martin's Press.

Betts, K. S. (1998). An institutional overview: Factors influencing faculty participation in distance education in postsecondary education in the United States: An institutional study. Online Journal of Distance Learning administration, 1(3). Retrieved February 12, 2001 on the World Wide Web: http://www.westga.edu/~distance/betts13.html

Black, D. P. (1999). Building switched networks: Multilayer switching, Qos, IP multicast, network policy, and service level agreements. Menlo Park, CA: Addison-Wesley.

Boettcher, J. V. (1999). 21st century teaching and learning patterns: What will we see? Syllabus Magazine, 12(10). Retrieved March 4, 2001 on the World Wide Web: http://www.syllabus.com/syllabusmagazine June99magfea.html

Boettcher, J. V., & Conrad, R. (1999). Faculty guide for moving teaching and learning to the Web. Menlo Park, CA: League for Innovation in the Community College.

Branden, J. V., & Lambert, J. (1999). Cultural and linguistic diversity: Threat or challenge for virtual instruction. In C. M. Feyten & J. W. Nutta (Eds.), Virtual instruction: Issues and insights from an international perspective (p. 206). Englewood, CO: Libraries Unlimited, Inc.

Brown, D. G. (2000). An overview. In D. G. Brown (Ed.), Teaching with technology: Seventy-five professors from eight universities tell their stories. Boston: Anker Publishing Company, Inc.

Burbules, N. C., & Torres, C. A. (2000). Globalization and education: Critical perspectives. New York: Routledge.

Campion, M. (1990). Open learning: Schooling and retooling society or deschooling and societal retooling? In R. Atkinson & C. McBeath (Eds.), Open learning and new technology: Conference proceedings (pp. 65-76). Perth: Australian Society for Educational Technology WA Chapter.

Chen, I. Z. (2000). The insights of the development of virtual education in the U.S.A to Taiwan. Information and Education, 76(2), 24-39.

Chen, N. S. (2002). Taiwan Internet development. Retrieved June 27, 2002 on the World Wide Web: http://apng.edu.tw/taiwan/twid.html

Chen, S. S., & Chu, S. I. (2000). In-service teachers' IT education and the curriculum. Information and Education, 80(6), 11-31.

Chen, T. S. (2000). The curriculum design of vocational maritime technology education based on STCW95. The Proceedings of Maritime Technology Annual Conference of R.O.C. 2000. NKIMT, Taiwan.

Chute, A. G., Thompson, M. M., & Hancock, B. W. (1999). The McGraw-Hill handbook of distance learning. New York: McGraw-Hill.

Clay, M. (1998). Development of training and support programs for distance education instructors. Retrieved February 12, 2001 on the World Wide Web: http://pebbles.westga.edu/~distance/clay23.html

Cobb, P. (1994). Where is the mind? Constructivist and sociocultural perspectives on mathematics development. Educational Research, 123, 13-20.

Cohen, M., & Miyake, N. (1986). A worldwide intercultural network: Exploring electronic message for instruction. Instructional Science, 15, 257-273.

Comer, D. E. (1999). Computer networks and internets. Upper Saddle River, NJ: Prentice-Hall, Inc.

Cutshall, T. (1999). Tom's definition of instructional technology. Retrieved May 20, 2001 on the World Wide Web: http://www.arches.uga.edu/~cutshall/tomitdef.html

Dawes, R. M. (1984). Approaches to the measurement of attitude. In R. L. Jones (Ed.), Attitudes and attitude change in special education: Theory and practice (pp. 56-87). Reston, VA: The Council for Exceptional Children.

Dhanarajan, G. (1998). International and inter-institutional collaboration in distance education. A conference on learning together: Collaboration in open learning. The John Curtin International Institute, Perth, Western Australia, 20-22, April 1998. Retrieved June 27, 2002 on the World Wide Web: http://www.col.org/speeches/curtin98.htm

Dodd, A.Z. (2000). The essential guide to telecommunications. Upper Saddle River, NJ: Prentice-Hall, Inc.

Doll, W. E. (1989). Foundations for a post-modern curriculum. Journal of Curriculum Studies, 21(3), 243-253.

Dominowski, R. L. (1980). Research methods. Englewood Cliffs, NJ: Prentice-Hall.

Draves, W. A. (2000). Teaching online. River Falls, WI: LERN Books.

Duin, A. H., Baer, L. L., & Starke-Meyerring, D. (2001). Partnering in the learning marketspace. San Francisco: Jossey-Bass

Editorial. (1999). Thinking about distance education. The Journal of Distance Education, 10, 1-3.

Editorial. (2000). Collaboration and cooperation to develop distance education. The Journal of Distance Education, 16, 1-3.

Fraenkel, J. R., & Wallen, N. E. (2000). How to design & evaluate research in education (4th ed.). Dubuque, IA: McGraw-Hill.

Gatliff, B., & Wendel, F. C. (1998). Inter-institutional collaboration and team teaching. The American Journal of Distance Education, 12(1), 26-37.

Gay, L. R., & Airasian, P. (2000). Educational research: Competencies for analysis and application (6th ed.). Upper Saddle River, NJ: Merrill.

Gehris, D.O. (1998). Using multimedia tools and applications on the Internet. Belmont, CA: Integrated Media Group.

Goldberg, M. W. (1997). Using a Web-based course authoring tool to develop sophisticated Web-based courses. In B. H. Khan (Ed.), Web-based instruction (pp. 307-312). Englewood Cliffs, NJ: Educational Technology Publications

Gough, N. (1989). Form epistemology to ecopolitics: Renewing a paradigm for curriculum. Journal of Curriculum Studies, 21(3), 225-241.

Gravetter, F. J., & Wallnau, L. G. (1999). Essentials of statistics for the behavioral sciences. New York: Brooks/Cole Publishing Company.

Han, S. M. (2000). The current situation and future prospects of information education. Information and Education, 77(3), 3-7.

Han, S. M. (2001). The current situation of information education in Taiwan. Information and Education, 81(1), 7-12.

Heath, C. (1999). Faculty attitudes towards distance education and use of instructional technology. Retrieved March 2, 2001 on the World Wide Web: http://www.syllabus.com/syll99_proceedings/FACUL.HTM

Ho, Z. K. (1998). Looking future prospects of elementary and high schools in information education from information education strategies of the Ministry of Education. Information and Education, 68(1), 2-13.

Ho, Z. K. (2001). Asian countries' information education: Development and perspectives. Information and Education, 81(1), 1-5.

Hodkinson, P. (1997). Neo-Fordism and teacher professionalism. Teacher Development 1(1), 45-59.

Holmberg, B. (1995). Theory and practice of distance education. New York: Routledge.

Howie, H., & Wen, J. (1997). Teachers' attitudes toward computer use. Journal of Technology Studies, 23(2), 60-62.

Ian, T. S. (2000). The connection of sailing policy and public administration: The current situation of seamen training and maritime technology education. The Proceedings of Maritime Technology Annual Conference of R.O.C. 2000. NKIMT, Taiwan.

IMO White List. Retrieved March 19, 2001 on the World Wide Web: http://www.marisec.org isf

Implementing STCW. Retrieved March 19, 2001 on the World Wide Web: http://www.marisec.org.isf

Institute for Information Industry. (2001). The report of the Internet Spring 2001. Retrieved May 2, 2001 on the World Wide Web: http://www.find.org.tw/howmany 2001spring.asp

Katz, D. (1960). The functional approach to the study of attitudes. Public Opinion Quarterly, 24, 163-204.

Kaye, B., & Medoff, N. J. (1999). The World Wide Web. Mountain View, CA: Mayfield Publishing Company.

Keegan, D. (1996). Foundations of distance education. New York: Routledge

Kelly, K. (1998). New rules for the new economy: 10 radical strategies for a connected world. New York: Penguin.

Keogh, J. (2001). The essential guide to networking. Upper Saddle River, NJ: Prentice Hall.

Kranzberg, M. (1997). Technology and history: "Kranzberg's Laws." In T. S. Reynolds & S. H. Cutcliffe (Eds.), Technology & the west: A historical anthology from technology & culture (pp. 5-20). Chicago: The University of Chicago Press.

Lau, L. (2000). Distance learning technologies: Issues, trends and opportunities. Hershey, PA: IDEA Group Publishing.

Liao, T., Liu, A. B., & Wu, C. K. (2000). The comparison of four-year and two- year school curriculum in vocational maritime technology. The Proceedings of Maritime Technology Annual Conference of R.O.C. 2000. NKIMT, Taiwan.

Lin, C. S., Ma, Z. L., & Lin, Z. N. (2000). The impact of Web-based distance education and schools on teachers' IT competency. Information and Education, 79(5), 2-12.

Manicas, P. (1998). The radical restructuring of higher education. Futures, 30(7), 651-656.

Mark, M. (1990). The definition of institutional structures and effectives in distance education. In M. G. Moore (Ed.), Contemporary issues in American distance education (pp. 25-64). London: Pergamon.

Mason, R. (1998). Globalising education: Trends and applications. New York: Routledge

Ministry of Education of R.O.C. (1999). Distance learning 4-year developing program. Taipei, Taiwan: Ministry of Education.

Ministry of Education of R.O.C. (2001). The current situation of the development of Web-based learning in higher education. Retrieved June 27, 2002 on the World Wide Web: http://www2.edu.tw/moecc/ii7205/dp/overviews/college_init.htm

Mood, T. A. (1995). Distance education: An annotated bibliography. Englewood, CO: Libraries Unlimited, Inc.

Moore, M. G. (1994a). Introduction. In M. M. Thompson (Ed.), Internationalism in distance education: A vision for higher education (pp. 1-4). University Park, PA: American Center for the Study of Distance Education

Moore, M. G. (1994b). Opening Remarks. Proceedings of international distance education conference. University Park, PA: American Center for the Study of Distance Education

Moore, M. G. (2000a). Preface: Distance learning and the Internet. In M. G. Moore & G. T. Cozine (Eds.), Web-based communications, the Internet, and distance education (pp. i-ii). University Park, PA: The American Center for the Study of Distance Education.

Moore, M. G. (2000b). Technology-driven change: Where does it leave the faculty? The American Journal of Distance Education,14(1), 1-6.

Moore, M. G., & Kearsley, G. (1996). Distance education: A systems view. New York: Wadsworth Publishing Co.

Moore, M. G., & Lambert, K. I. (1996). Motives for collaborating in international higher distance education. Retrieved June 12, 2002 on the World Wide Web: http://www.cde.psu.edu/DE/ACSDE/ACSD.htm

Moran, L., & Mugridge, I. (1993). Collaboration in distance education: An introduction. In L. Moran & I. Mugridege (Eds.), Collaboration in distance education: International case studies (pp. 1-11). New York: Routledge

Moschovitis, C. J. P., Poole, H; Schuyler, T., & Senft, T. M. (1999). History of the Internet: A chronology, 1843 to the present. Dever, CO: Abc-clio, Inc.

Mosenthal, J. H., & D. L. Ball. (1992). Constructing new forms of teaching: Subject matter knowledge in inservice teacher education. Journal of Teacher Education, 43 (5), 347-356.

Murhammer, M. W., Atakan, O., Bretz, S., Pugh, L. R., & Wood, D. H. (1998). TCP/IP tutorial and technical overview. Upper Saddle River, NJ: Prentice-Hall, Inc.

Murphy, T. H.,& Terry, R. (1995). Faculty needs associated with agricultural distance education. Retrieved March 25, 2001 on the World Wide Web: http://www.ssu.missouri.edu/ssu/AgEd/NAERM/s-a-2.htm

Nasser, R., & Abouchedid, K. (2000). Attitudes and concerns towards distance education: The case of Lebanon. Retrieved March 5, 2001 on the World Wide Web: http://www.westga.edu/~distance/ojdla/winter34/nasser34.html

Navarro, P., & Shoemaker, J. (2000). Performance and perceptions of distance learners in cyberspace. In M. G. Moore & G. T. Cozine (Eds.), Web-based communications, the Internet, and distance education (pp. 1-15). University Park, PA: The American Center for the Study of Distance Education.

Ndahi, H. B. (1999). Utilization of distance learning technology among industrial and technical teacher education faculty. Journal of Industrial Teacher Education, 36(4), 21-36.

Neil, M. W. (1981). Education of adults at a distance. New York: Routledge

Oskamp, S. (1977). Attitudes and opinions. Englewood Cliffs, NJ: Prentice-Hall, Inc.

Parsons, J. J., & Oja, D. (2000). Computer concepts (4th ed.). New York: An International Thomson Publishing Company.

Perdue, K. J., & Valentine, T. (1998). Beliefs of certified public accountants toward distance education: A statewide Georgia Survey. The American Journal of Distance Education, 12(3), 29-41.

Perdue, K. J., & Valentine, T. (2000). Deterrents to participation in Web-based continuing professional education. In M. G. Moore & G. T. Cozine (Eds.), Web-based communications, the Internet, and distance education (pp. 38-53). University Park, PA: The American Center for the Study of Distance Education.

Peterson, S. L. (1999). Teachers and technology: Understanding the teacher's perspective of technology. San Francisco: International Scholars Publications.

Renner, W. (1995). Post-Fordist visions and technological solutions: Education technology and the labour process. Distance Education, 16(2), 285-301.

Rockwell, S. K., Hall, A., Schauer, J., Fritz, S. M., & Marx, D. B. (1999). Incentives and obstacles influencing higher education faculty and administrators to teach via distance. Online Journal of Distance Learning Administration, 2(4). Retrieved June 6, 2000 on the World Wide Web: http: www.westga.edu/~distance rockwell24.html

Rogers, E. M. (1995). Diffusion of innovations. New York: The Free Press.

Romeu, J. L. (2000). Technology and international education. Journal of Educational Technology Systems, 28(4), 305-310.

Schuman, H., & Presser, S. (1996). Questions and answers in attitude surveys, experiments on question form, wording and context. Thousand Oaks, CA: SAGE Publications, Inc.

Schweizer, H. (1999). Designing and teaching an on-line course: Spinning your web classroom. Needham Heights, MA: Allyn & Bacon.

Sharda, N. K. (1999). Multimedia information networking. Upper Saddle River, NJ: Prentice-Hall, Inc.

Sherritt, C. (1999). Hong Kong and Taiwan: Two cases studies in open and distance learning. Asian Affairs: An American Review, 26(1), p. 37. Retrieved April, 22, 2001 on the World Wide Web: http://web1.infotrac.galegrooup.com/itw/infomark/888/322/33792166w3/pur

Simonson, M. (1999). Equivalency theory and distance education. TechTrends, 43 (5), 5-8.

Simonson, M., Smaldino, S., Albright, M., & Zvacek, S. (2000). Teaching and learning at a distance: Foundation of distance education. Columbus, OH: Merrill.

Skolnik, M. L. (1998). Higher education in the 21st century. Perspective on an emerging body of literature. Futures, 30(7), 635-650.

Standards for Technological Literacy: Content for the study of technology (2000). Reston, VA: International Technology Education Association.

Sullivan, J. (1999). Statewide online Web-based training program to prepare New Jersey community college faculty for distance teaching (Doctoral dissertation, Nova Southeastern University, 1999), Digital Dissertations, AAT 9950863.

Thompson, M. M. (1994). Internationalism in distance education: A vision for higher education. University Park, PA: American Center for the Study of Distance Education.

Trindade, A. R. (1994). Globalization of distance education: Setting a trans-Atlantic policy for collaboration. In M. M. Thompson (Ed.), Internationalism in distance education: A vision for higher education (pp. 39-44). University Park, PA: American Center for the Study of Distance Education.

Tseng, E. M. (1995). Present status and perceived importance of computer skills in a Taiwanese service industry. Unpublished doctoral dissertation, University of Northern Iowa, Iowa.

U. S. Department of Education, National Center for Education Statistics. (1999). Distance education at postsecondary education institutions1997-98, NCES 2000 -013. [Report prepared by Laurie, Lewis, Kyle Snow, Elizabeth Farris, and Douglas Levin, Bernie Green, project officer.] Washington, DC: Government Printing Office.

Watkins, B. L., & Wright, S. J. (1991). The foundations of American distance education: A century of collegiate correspondence study. Dubuque, IA: Kendall/Hunt.

Wedemeyer, C. A., & Childs, G. B. (1961). New perspectives in university correspondence study. Chicago: Center for the Study of Liberal Education for Adult.

Wen, G. Z. (1999). The impact of information and computer networking on teachers. Information and Education, 72(4), 10-14.

Williams, R., & Tollett, J. (1998). The non-designer's web book: An easy guide to creating, designing, and posting your own web site. Berkeley, CA: Peachpit Press.

Wright, L.,& Landa, D. (1996). Technology and the quality of life. In E. N. Israel (Eds.) Technology and the quality of life (pp. 56-73). New York: McGrave-Hill.

Wu, C. K. (2000). AMC-NKIMT international program. Unpublished manuscript in National Kaoushiung Institute of Marine Technology, Taiwan.

Wu, T. S. (1998). Web-based teaching. Information and Education, 67(5), 1-2.

Wu, T. S. (2000). The impact of information technology on teachers. Information and Education, 79(5), 1-2.

Yin, C. H. (1998). The current situation of development of distance education and life long learning by the Ministry of Education. Information and Education, 66(4), 2-6.

Young, I. C. (1999). Theory and application of the Internet. Taiwan: Culture Publishing, Inc.

Young, M. S. (2000). The current situation and future development of maritime technology of vocational high schools. The Proceedings of Maritime Technology Annual Conference of R.O.C. 2000. NKIMT, Taiwan.

Young, S. U. (1998). The management of marine engineering. Taiwan: Tong Hua Publishing, Inc.

APPENDIX A

HUMAN RESEARCH

The University of Northern Iowa

May 7, 2001

Chun-mei Shieh
207 G Street
Cedar Falls, IA 50613

Dear Chun-mei Shieh:

Your project, "Web-based Distance Instructional Partnership for Maritime Technology of Pacific Rim Countries," which you submitted for human subjects review on May 2, 2001, has been determined to be exempt form further review under the guidelines stated in the UNI Human Subjects Handbook. You may commence participation of human research subjects in your project.

Your project need not be submitted for continuing review unless you alter it in a way that increases the risk to the participants or you change the subject pool. If you make any such changes in your project, you should notify the Graduate College office.

If you decide to seek federal funds for this project, it would be wise not to claim exemption from human subjects review on your application. Should the agency to which you submit the application decide that your project is not exempt from review, you might not be able to submit the project for review by the UNI Institutional Review Board within the federal agency's time limit (30 days after application). As a precaution against applicants' being caught in such a time bind, the Board will review any projects for which federal funds are sought. If you do seek federal funds for this project, please submit the project for human subjects review no later than the time you submit your funding application.

If you have further questions abut the Human Subjects Review system, please contact me. Best wishes for your project.

Sincerely,

Norris M. Durham, Ph.D.
Chair, Institutional Review Board

c: Dr. David A. Walker, Associate Dean
Dr. John Fecik

i/office/humanenv.frm

Graduate College 122 Lang Cedar Falls, Iowa 50614-0135 (319) 273-2748 FAX: (319) 273-2243

APPENDIX B

RESEARCH QUESTIONS ADDRESSED BY THE ITEMS ON QUESTIONNAIRE

To comply with the correlational research design and the correlational statistical technique, the pairs of scores are correlated and calculated to indicate the degree of relationship between the variables. Research Question (RQ) 1 seeks to find out the results of the investigation from Part II and Part III. The results of RQ 2 are from Part I and Part II. The results of RQ 3 are from Part III and I. The results of RQ 4 are from Part IV and Part II. The results of RQ 5 are from Part IV and Part III. The results of RQ 6 are from Part VI and Part II.

Research Question 1: What are the similarities and/or differences in attitudes and intentions regarding Web-based distance education and Web-based international education programs among the faculty at nine vocational high schools, two junior colleges, the two universities in Taiwan, and the faculty at AMC in Australia?

Part II: 11, 12, 13, 14, 15, 16, 17, 18, 19, and 20.

Part III: 21, 22, 23, 24, 25, 26, 27, 28, 29, and 30.

Research Question 2: What is the relationship between perspectives on educational technology and Web-based education?

Part I: 01, 02, 03, 04, 05, 06, 07, 08, 09, and 10.

Part II: 11, 12, 13, 14, 15, 16, 17, 18, 19, and 20.

Research Question 3: What is the relationship between perspectives on educational technology and Web-based international education programs?

Part I: 01, 02, 03, 04, 05, 06, 07, 08, 09, and 10.

Part III: 21, 22, 23, 24, 25, 26, 27, 28, 29, and 30.

Research Question 4: What is the relationship between the faculty's skills with computers, WWW, and WCM tools and Web-based instruction?

Part IV: 31, 32, 33, 34, 35, 36, 37, 38, 39, and 40.

Part II: 11, 12, 13, 14, 15, 16, 17, 18, 19, and 20.

Research Question 5: What is the relationship between the faculty's skills with computers, WWW, and WCM tools and Web-based international education programs?

Part IV: 31, 32, 33, 34, 35, 36, 37, 38, 39, and 40.

Part III: 21, 22, 23, 24, 25, 26, 27, 28, 29, and 30.

Research Question 6: What is the relationship between age and Web-based distance education?

Part VI: 52.

Part II: 11, 12, 13, 14, 15, 16, 17, 18, 19, and 20.

APPENDIX C

ENGLISH VERSION OF QUESTIONNAIRE

Maritime Technology Faculty Attitudes and Needs Analysis Regarding We

Based Distance Education & International Education Survey

Directions:

- The questionnaire consists of five parts. There are 49 questions. For each question, there are five choices: 1. Strongly Disagree (SD), 2. Disagree (D), 3. Undecided (UD), 4. Agree (A), 5. Strongly Agree (SA). Please underline your choice on the questionnaire. For example: Language obstacles are a concern in Web-based international education. If your choice is Agree, then underline the figure 4, which means Agree (A).
- An additional comment sheet is enclosed if you have comments regarding Part I through Part V.
- If you have any questions with respect to the questionnaire, feel free to contact me, Chun-Mei Shieh by email shiehc4519@uni.edu. Please return the questionnaire prior to June 24, 2001.

Your Cooperation and Assistance Are Greatly Appreciated.

Part I. Instructors' Perspectives on Educational Technology

Directions: In this part there are ten questions. Please underline the choice that best describes your thoughts and opinions on the questionnaire. The scale is
41. Strongly Disagree (SD), 2. Disagree (D), 3. Undecided (U), 4. Agree (A),
42. Strongly Agree (SA).

Explanation:

- *Educational technology is defined as using modern information technology such as television, computer, the Internet, and satellite to facilitate teaching and learning.*
- *Perspectives on educational technology: this is defined as the faculty members' attitudes and their views toward educational technology with an emphasis on the craft or art of using technology to support teaching and learning.*

	SD	D	U	A	SA
01. Educational technology is changing too rapidly for me to stay abreast of it.	1	2	3	4	5
02. Educational technology can allow information to be shared effectively.	1	2	3	4	5
03. Educational technology can be used to organize knowledge	1	2	3	4	5
04. Educational technology can be combined with traditional methods of instruction.	1	2	3	4	5
05. Educational technology can make instructional design more flexible.	1	2	3	4	5
06. Educational technology used in the classroom can facilitate learning activities.	1	2	3	4	5
07. Educational technology can be used efficiently to assess students' learning.	1	2	3	4	5
08. Incorporating educational technology into teaching is time-consuming.	1	2	3	4	5
09. Educational technology can reduce stress for teachers.	1	2	3	4	5
10. Educational technology can cause learners to become more autonomous.	1	2	3	4	5

Part II. Attitudes Regarding Web-based Distance Education

Directions: In this part there are ten questions. Please underline the choice that best describes your thoughts and opinions on the questionnaire. The scale is 43. Strongly Disagree (SD), 2. Disagree (D), 3. Undecided (U), 4. Agree (A), 44. Strongly Agree (SA).

Explanation:

- *Web-based distance education: Distance education has evolved through a number of different stages which includes correspondence study, radio, television and audiotapes, broadcast systems, telephone, satellite, cable, and fiber optic lines that are not computer mediated, and online learning, which is computer mediated learning and teaching. In this study, the term used to describe computer mediated network learning and teaching is Web-based distance education.*

	SD D U A SA
11. Web-based distance education has a positive impact on education.	1 2 3 4 5
12. Web-based distance education is an effective educational tool.	1 2 3 4 5
13. Assessment of learner performance in Web-based instruction is time-consuming.	1 2 3 4 5
14. Losing my intellectual property rights on the Internet is a concern.	1 2 3 4 5
15. Traditional classroom instruction rather than Web-based instruction is preferred.	1 2 3 4 5
16. Web-based distance education is an option for earning academic degrees.	1 2 3 4 5
17. New forms of teaching prohibit me from offering online courses.	1 2 3 4 5
18. Additional compensation for teaching a distance class is required.	1 2 3 4 5
19. Additional time to prepare for distance learning classes is important.	1 2 3 4 5
20. Support-staff assistance to prepare for distance learning classes is needed.	1 2 3 4 5

Part III. Perceptions of Web-based International Education Programs

Directions: In this part there are ten statements. Please underline the choice that best describes your thoughts and opinions on the questionnaire. The scale is
45. Strongly Disagree (SD), 2. Disagree (D), 3. Undecided (U), 4. Agree (A),
46. Strongly Agree (SA).

Explanation:

- *Web-based international distance education programs: This is defined as the practice of teaching and learning across national borders.*

	SD	D	U	A	SA
21. The concept of global interdependence can be deepened via Web-based international education.	1	2	3	4	5
22. WWW technology makes it possible for faculty across national borders to participate in course development.	1	2	3	4	5
23. Language obstacles are a concern in Web-based international education.	1	2	3	4	5
24. Cultural differences concern me in education across national borders.	1	2	3	4	5
25. Cultural imperialism is a problem in education across national borders.	1	2	3	4	5
26. The idea of utilizing foreign educational services without leaving home appeals to me.	1	2	3	4	5
27. Web-based international education brings new meaning to the term "exchange students".	1	2	3	4	5
28. Web-based international education can inspire student interaction across national borders.	1	2	3	4	5
29. Web-based international education can inspire faculty interaction across national borders.	1	2	3	4	5
30. Many faculty jobs will disappear as recognized experts offer courses to thousands of students on line.	1	2	3	4	5

Part IV. Skills with Computers, World Wide Web (WWW), and Web Course Management (WCM) Tools Related to Design, Development, and Delivery of Web-based Courses

Directions: In this part there are ten questions. Please underline the choice that best describes the assessment of your knowledge on the questionnaire. The scale is 47. Strongly Disagree (SD), 2. Disagree (D), 3. Undecided (U), 4. Agree (A), 48. Strongly Agree (SA).

Explanation:

- *Plug-in is a mini-program that adds controls within a Web page in order to play a sound or display a movie. Web browsers are generally limited to displaying standard formats such as HTML, text, GIF, and JPEG. When a browser encounters any other kinds of files, e.g., a sound, a video, or a spreadsheet file, it relies on plug-in to displays the files. If visitors to a Web-page do not have the appropriate plug-in, they will not be able to view the files until they download such a program.*

- *Software is defined as a set of detailed, step-by-step instructions that tell a computer how to solve a problem or carry out a task. Software can be categorized as systems software and application software. System software helps the computer carry out its basic operating tasks. Examples of system software are device drivers, utilities, programming languages, and operating systems including DOS, OS/2, Windows, and UNIX. Application software helps the human user carry out a task. Examples of application software include document production, presentation, graphics, etc.*

- *Web Course Management (WCM) tools: Web Course Management tools are software, such as WebCT, TopClass, BlackBoard, and Convene, used to conduct online courses. These tools can help faculty and support staff with the design, development, and delivery of Web-based courses. Web-Based Instruction tools (WBI) and Web-Based Class Management tools (WCMT) are the terms used for the tools that provide a framework or template for the steps used to offer a course online.*

Part IV. Skills with Computers, World Wide Web (WWW), and Web Course Management (WCM) Tools Related to Design, Development, and Delivery of Web-based Courses

	SD	D	U	A	SA
31. Understanding the basic concepts of computer hardware (e.g. CPUs, keyboard) is not difficult for me.	1	2	3	4	5
32. Understanding the basic concepts of computer software (e.g. system software, application software) is not difficult for me.	1	2	3	4	5
33. Installing software is not difficult for me.	1	2	3	4	5
34. The use of Web Browsers (e.g. Netscape, Internet Explorer) is not difficult for me.	1	2	3	4	5
35. The use of plug-in software (e.g. Real Player, Adobe Acrobat Reader) is not difficult for me.	1	2	3	4	5
36. The use of search engines (e.g. Yahoo, Google) is not difficult for me.	1	2	3	4	5
37. The use of on-line applications (e.g. e-mail, file attachment, electronic discussion groups, teleconferencing tools) is not difficult for me.	1	2	3	4	5
38. The skills of Web-page design using HTML (Hypertext Markup Language) are not difficult for me.	1	2	3	4	5
39. The procedures of how courses are conducted on line are not difficult for me.	1	2	3	4	5
40. The use of WCM tools (e.g. WebCT, Blackboard, Top Class, or Convene) to deliver courses online is not difficult for me.	1	2	3	4	5

Part V. Training Programs for Faculty to Deliver Courses Online

Directions: Please check the response which best describes the types of learning accommodations you prefer. From 41 to 43 choose **ONLY ONE**. Mark your response on the response answer sheet.

41. Ways of conducting a training program:

1. Seminars or conferences
2. Hands-on workshops
3. Self-paced learning via CD
4. One-on-one instruction

42. Time period for conducting a training program:

1. Summer
2. Weekdays
3. Weekends

43. Location for conducting a training program:

1. Campus site
2. External campus site

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

Contents of a training program

Directions: Please check the items that describe your needs. From 44 to 48 choose **AS MANY AS APPLY TO YOU**

44. Web Page Design and Creation:

1. Introduction to HTML
2. Adding multimedia on the Web
3. Uploading to a Web Server
4. Creating Web Pages using HTML
5. Creating Web Pages using editing software (e.g. Netscape Composer, FrontPage)

45. Multimedia Techniques on the Web I:

1. Creating and editing graphics
2. Recording and editing sounds and music
3. Creating Web animation
4. Creating and editing a video file
5. Creating and editing text

46. Multimedia Techniques on the Web II:

1. Compressing files
2. Converting presentation files to Web page
3. Using multimedia products (e.g. digital camera, digital video camera)

47. WCM tools:

1. Introduction to WCM tools (e.g. WebCT, Blackboard, TopClass, and Convene)
2. Introduction to the concepts (e.g. the e-Learning Hub, e-Learning resources packs), and their features used to create entire courses online or to complement a classroom-based course
3. Course Utilities includes Course Builder, Designer Map, Course Appearance, Manage Students, Manage Files, Content Assistant, Language, and Resume Course.
4. Course Components includes Course Homepage, Syllabus, and Content Module
5. Course Tools includes Assignments, Calendar, Communication, and Quiz and Survey.

48. Additional software tools

1. Word processing
2. Presentation software
3. Spreadsheet
4. Databases

49. I am familiar with the rules of STCW'95.

1. Strongly disagree
2. Disagree
3. Undecided
4. Agree
5. Strongly Agree

50. I agree to assist seafarers of Taiwan to get certificates through Web-based international program from the nations who are the members of United States.

1. Strongly disagree
2. Disagree
3. Undecided
4. Agree
5. Strongly Agree

Part VI. Demographic Information

Direction: Please underline the response on the questionnaire.

51. Gender:

1. Male 2. Female

52. Age:

1. Below 30 2. 31-40 3. 41-50 4. 51-60 5. Above 61

53. Years of Service:

1. Below 5 years 2. 6-10 years 11-20 years
4. 21-30 years 5. Above 31 years

54. Faculty Rank:

1. Full professor 2. Associate professor 3. Assistant professor
4. Senior Lecture 5. Lecturer

55. What is the highest educational degree that you have earned?

1. Bachelor 2. Master 3. Doctorate
4. Technicians with licenses 5. Others

56. Do you have access to the Internet at home? 1. Yes. 2. No.

57. Do you use the Internet in class preparation? 1. Yes. 2. No.

58. Do you have an email account? 1. Yes. 2. No.

59. Do you use computers for word processing? 1. Yes. 2. No.

60. The Name of Your School _____

Thank you for your assistance.

Please save this questionnaire as a word file and email it back by the following address: **shiehc4519@uni.edu** as an attached file.

APPENDIX D

CHINESE VERSION OF QUESTIONNAIRE

海事技職體系內同仁對網路教學及網路國際教育的調查

說明事項：

1. 本問卷有六部份、共有58個問題。請把您的選項圈在問卷上。例如：語言問題是網路國際教育的一種障礙。總共有5個選項：1.表示極為不同意(SD)；2.表示不同意(D)；3.表示未置可否 (UD)；4.表示同意(A)；5.表示極為同意(SA)。如果您的選擇是不同意，那麼請在問卷上2.表示不同意(D)的選項上劃圈。

2. 另附上意見表，從第一部份到第五部份，如果您有意見及看法，請填寫在此附表上。

3. 每張問卷都有一個編碼以為匿名之用。

4. 對於本問卷，如有任何問題，請以電話(07) 3657460 或是電子郵件: hs3003@ksts.seed.net.tw連絡。

5. 請在6月15日以前寄回本問卷。

非常感激您的合作與協助！

第一部份：教師對教育科技(Educational Technology)的看法

說明事項：本部份共有10個問題，每個問題有5種選擇。

1.極不同意(SD)；2.不同意(D)；3.未置可否 (UD)；4.同意(A)；

5.極為同意(SA)。請將最能表示您的想法和意見的選項圈在問卷上。

解釋：

- ▶ 教育科技定義為使用電視、電腦、光碟片、以及網際網路等現代資訊科技去輔助教學的科技。
- ▶ 教育科技的看法：此定義為教師利用現代科技去輔助教學的態度與觀點。在此所強調的是使用教育科技授課的技術或藝術。

	SD	D	UD	A	SA
01.教育科技發展太快了，使我很難跟上其變化。	1	2	3	4	5
02.教育科技使得傳遞與分享資訊更有效。	1	2	3	4	5
03.教育科技能夠使得知識組織系統化。	1	2	3	4	5
04.教育科技能與傳統課堂教育結合應用。	1	2	3	4	5
05.教育科技使得課程的設計更為靈活。	1	2	3	4	5
06.使用教育科技能促進現代學生參與課堂學習活動。	1	2	3	4	5
07.教育科技用於學習評量時效果更佳。	1	2	3	4	5
08.在傳統教育中應用教育科技長期下來是非常耗時的。	1	2	3	4	5
09.老師應用其熟悉的教育科技能減少教學的壓力。	1	2	3	4	5
10.教育科技能促進現代學生的學習主動性。	1	2	3	4	5

第二部份：教師對網路遠距教育(Web-based Distance Education)的態度

說明事項：本部份共有10個問題，每個問題有5種選擇。

1. 極不同意(SD)；2.不同意(D)；3.未置可否(UD)；4.同意(A)；

5.極為同意(SA)。請將最能表示您的想法和意見的選項圈在問卷上。

解釋：

► 網路遠距教育：遠距教育經歷幾個階段的演進。從函授、收音機、電視、錄音帶、廣播、電話、衛星、有線電、到光纖電纜等非網路為主的遠距教育到以網路為主的遠距教育。本調查乃是針對以網路為主的遠距教育。

	SD	D	UD	A	SA
11.網路遠距教育對學習有正面的影響。	1	2	3	4	5
12.網路遠距教育是一種有效的教育工具。	1	2	3	4	5
13.評估網路遠距教育的學習成果是很耗時的。	1	2	3	4	5
14.在網路上保護智慧財產權是我所關心的問題。	1	2	3	4	5
15.我喜歡傳統教學法勝過網路遠距教學法。	1	2	3	4	5
16.網路遠距教育是取得學位的另一種途徑。	1	2	3	4	5
17.網路上各種新的教法使我怯於開授網路課程。	1	2	3	4	5
18.對初期開授網路課程的教師應給與額外的報酬。	1	2	3	4	5
19.對初期開授網路課程的教師應減少授課時數。	1	2	3	4	5
20.對初期開授網路課程的教師應給與配備輔助人員。	1	2	3	4	5

第三部份：教師對於網路國際教育(Web-based International Education)的見解

說明事項：本部份共有10個問題，每個問題有5種選擇。

1. 極不同意(SD)；2.不同意(D)；3.未置可否(UD)；4.同意(A)；5.極為同意(SA)。請將最能表示您的想法和意見的選項圈在問卷上。

解釋：▶ 網路國際教育：藉由網路跨越國界開授課程給不同國度的學生。

	SD	D	UD	A	SA
21.網路國際教育能夠促進國際合作。	1	2	3	4	5
22.全球資訊網使得教師能夠跨越國際去參與課程的設置。	1	2	3	4	5
23.語言問題是網路國際教育的一個障礙。	1	2	3	4	5
24.教學與學習上的文化差異是網路國際教育的一個問題。	1	2	3	4	5
25.文化帝國主義是網路國際教育的一個問題。	1	2	3	4	5
26.網路國際教育使得不離開家與工作崗位者可以充份利用國外教育資源。	1	2	3	4	5
27.網路國際教育賦予國際「交換學生」這個名詞新的定義。	1	2	3	4	5
28.網路國際教育能夠鼓勵學生參與跨越國界的學習活動。	1	2	3	4	5
29.網路國際教育能夠鼓勵老師參與跨越國界的教學和研究活動。	1	2	3	4	5
30.因為有名望的教授能透過網路課程給大量的學生授課，所以對教師需要量將會大大的減少。	1	2	3	4	5

第四部份：使用電腦、全球資訊網和網路教學軟體去設計發展和授課的技巧

說明事項：本部份共有10個問題，每個問題有5種選擇。

1. 極不同意(SD)；2.不同意(D)；3.未置可否(UD)；4.同意(A)； 5

2. 極為同意(SA)。請在問卷上圈出最能表示您在這方面知識技巧

3. 的評定的答案。

解釋：

►外掛軟體是一小型的軟體。其目的是加強網頁功能，以便能播放聲音檔或是影像檔。一般而言，網路瀏覽器只能瀏覽HTML、文字、圖形檔和GIF或是JPEG。當瀏覽器碰上其它檔案（例如聲音、影像或是試算表檔案）便需依賴外掛軟體來顯示這些檔案了。如果網頁瀏覽者沒有適當的外掛軟體，他們是沒有辦法在網頁上瀏覽到影像、聲音檔。

►軟體被定義為詳細的，一步一步的指導說明。告訴電腦如何執行一項工作，或是解決一個問題。軟體被區分為系統軟體和應用軟體兩大類。系統軟體幫助電腦執行基本的操作工作。這類的軟體包括驅動電腦軟體、工具軟體、程式語言軟體。操作系統軟體包括DOS, OS/2, Windows, 和UNIX。電腦應用軟體幫助使用者執行一項工作。例如文件編輯、製作、簡報軟體、圖形編輯軟體等等。

►網路授課管理工具就是用來放課程上網的電腦軟體，例如WebCT, TopClass。這些工具或軟體可以幫助教師們設計發展課程內容和把它放上網。因此可以省下許多時間去架設網站授課。目前最常使用的兩個名詞為網路為主的指導工具(Web-based Instruction tools, WBI)和與網路為主的管理工具(Web-based Management tools, WCM)，這些課程軟體提供老師們架構課程內容及樣式，然後把課程放上網。

	SD	D	UD	A	SA
31.瞭解電腦硬體的基本概念（例如：中央處理器、鍵盤的操作）對於我而言並不難。	1	2	3	4	5
32.瞭解電腦軟體的基本概念（例如：系統軟體、應用軟體）對於我而言並不難。	1	2	3	4	5
33.使用網路瀏覽器（例如：領航者、探險家）對我而言並不難。	1	2	3	4	5
34.使用外掛軟體（例如：Real Player, Adobe Acrobat Reader）對我而言並不難。	1	2	3	4	5
35.使用搜尋引擎（例如：Yahoo, Google）對我而言並不難。	1	2	3	4	5
36.使用網路軟體（例如：電子郵件、附加檔案、電子討論小組、遠距會議工具）對我而言並不難。	1	2	3	4	5
37.使用使用HTML（超文字檔案的標記語言）設計教學網頁及網際連結對我而言並不難。	1	2	3	4	5
38.使用網路課程軟體（例如：WebCT, Blackboard, Top Class或Convene）去設計發展適當層級之課程，了解我校在此教育之定位，對我而言並不難。	1	2	3	4	5
39.使用網路課程軟體（例如：WebCT, Blackboard, Top Class或Convene）設計我校負責之課程部份，並兼顧及與橫向連結對我而言並不難。	1	2	3	4	5
40. 使用網路課程軟體（例如：WebCT, Blackboard, Top Class或Convene）設計我校負責之課程部份，並兼顧及與上下縱向銜接對我而言並不難。	1	2	3	4	5

第五部份：網路授課培訓

說明事項：請選出最適合您的學習情況的選項。從第41項至第43項，是為單選題。請將您的答案圈在問卷上。

解釋：

▶ 培訓課程：這個課程的目的是鼓勵支持海事院校體系的同仁們，利用教育科使技課程內容更為有趣，多樣化以及利用教育科技去授課。

41. 開授訓練課程的方式：

1. 討論會(seminar)或會議(conference)　　2. 實習研討會(workshop)

3. 以光碟片自我學習　　4. 一對一指導

42. 開授培訓課程的時間：

1. 寒暑假　　2. 星期一至星期五　　3. 週末

43. 開授培訓課程的地點：

1. 校園內　　2. 校園外

培訓課程內容

說明事項：請選出適合您的選項。從第44項至第48項是為需要學習的項目，可為**複選題**，請將您的答案圈在問卷上。

44. 網頁設計

1. HTML的介紹
2. 以HTML編輯網頁
3. 多媒體與網頁
4. 如何將網頁上載到伺服器
5. 以網頁編輯軟體(例如：Netscape Composer,FrontPage)網輯網頁

45. 網頁多媒體技巧（一）

1. 編輯製作圖片
2. 錄音、剪輯聲音和音樂
3. 製作網頁動畫
4. 錄製編輯影像
5. 製作編輯文

46. 網頁多媒體技巧（二）

1. 壓縮檔案
2. 將簡報檔案放上網頁
3. 使用電子數位產品（例如數位相機、數位錄影機）

47. 網路授課軟體

1. 介紹各類網路授課軟體（例如：WebCT, Topclass）
2. 介紹e-學習中心和e-學習特色以及他們如何用來設計和上載整個課程上網或是輔助教學的特色
3. 輔助課程項目包括：建立課程、設計課程、課程外觀、管理學生、管理檔案、內容輔助，語言轉換及重新開始課程。

4. 組成課程要素包括：課程網頁、課程摘要、及內容組成單元的編輯

5. 課程工具包括：作業、行事曆、師生及同學間的互動溝通，考試和課程意見反映調查

48. 其他應用軟體：

1. 文書處理　　2. 簡報軟體

3. 試算表　　4. 資料庫

49. 對於 **STCW '95** 之新規定我的熟悉程度:

1. 極不熟悉　　2. 不熟悉　　3. 未置可否

4. 熟悉　　5. 極熟悉

50. 我同意協助學生經由網路課程取得**STCW '95**聯合國會員國核發的海員証書:

1. 極不同意　　2. 不同意　　3. 未置可否

4. 同意　　5. 極同意

第六部份：基本資料

說明事項：從第51項至第60項，請將答案圈寫在問卷上。

51. 性別

1. 男性　　2. 女性

52. 年紀

1. 30以下　　2. 31-40　　3. 41-50

4. 51-60　　5. 61以上

53. 教學服務年資

1. 5年以下　　2. 6-10年　　3. 11-20年

4. 21-30年　　5. 31以上

54. 職等

1. 教授　　2. 副教授　　3. 助理教授

4. 講師　　5. 教師

55. 最高學經歷(可複選)

1. 學士　　2. 碩士　　3. 博士

4. 有證照的專業人員　　5. 其他

56. 您在家有上網的管道嗎？　　1. 有　　2. 沒有

57. 您有使用網路來備課嗎？　　1. 有　　2. 沒有

58. 您有電子郵件帳號嗎？　　1. 有　　2. 沒有

59. 您有用電腦來處理文件嗎？　　1. 有　　2. 沒有

60. 任教學校：_____

謝謝您的協助！

請在6/15前連同回郵信封寄回

APPENDIX E

COVER LETTERS

Invitation for Participation in Doctoral Research

June 11, 2001
Dear Participants:

Due to advances in information technologies and the accessibility of resources through the Web, Web-based distance education has become an efficient way to offer education and training to learners located in different places, even across national borders. Conducting courses by the Internet appears to be a promising alternative to traditional classroom instruction.

This investigation is the major portion of my doctoral research in the Department of Industrial Technology, University of Northern Iowa, USA and is conducted by the cooperation and support of the Department of Marine Engineering and Merchant Ship Seafarer Training Center at the National Kaohsiung Institute of Marine Technology (NKIMT) in Taiwan.

The purpose of this doctoral research survey is to investigate maritime technology faculty's attitudes and perceptions regarding Web-based distance education and Web-based international education. The results of this survey could be guidelines for offering Web-based courses across national borders. Therefore, your responses and opinions are very valuable to this study.

The questionnaire consists of five parts. An additional comment sheet is included for your comments on each part. To obtain a copy of the results of this study, please check and return the enclosed form. A copy will be mailed to you when the study is completed.

Each questionnaire will be treated as a confidential document and will not be individually reported. After the study is finished, the questionnaire will be destroyed. Completion of the questionnaire would not take longer than 15 minutes. Please complete the attached questionnaire prior to June 24, 2001 and send it back to the email address: shiehc4519@uni.edu

Thank you for your assistance.

Chun-Mei Shieh
Doctoral Candidate

Dr. John T. Fecik
Dissertation Advisor
Dept. of Industrial Technology
University of Northern Iowa

Mang Hsieh
Chairman, Dept. of Marine Eng.
NKIMT

Tsung Liao
Director of Merchant Ship Seafarer
Training Center of NKIMT

邀請函

邀請參與本研究

親愛的參與者：

由於資訊科技的進步，許多訊息皆可經由網路取得。以網路為主的遠距教育已經成為提供教育及培訓的一種有效方式。網路遠距教育的優點是不受時空和國界的限制。網路課程已嚴然成為傳統課堂學習外的另一種很有願景的學習方式。

本調查是由國立高雄海洋技術學院船員訓練中心及輪機工程系所合辦的，目的之一是要知道海事技職體系內所有同仁對於網路遠距教育以及網路國際教育的態度及觀點。目的之二是要利用現代網路資訊之便增強海事技職教育橫向與縱向的緊密夥伴關係，探討網際網路教學在海事技職體系內研究與運用的可能性。目的之三是因應STCW '95之新規定，藉網路科技之便參與其他國家提供之教育訓練學程或與海事會員國建立夥伴關係，有助於海員證書之取得。同時，其調查結果將成為提供海事院校同仁們課程上網培訓的參考及指導方針。因此您的參與及意見是非常寶貴的。

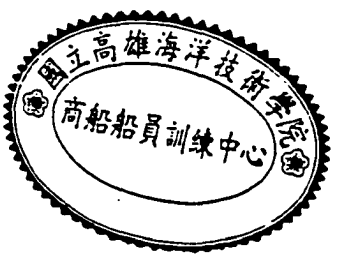
本問卷總共有六大部份。另附有額外意見表，如您有意見要表達，請填寫在這上面。問卷上的編碼是為了匿名之用的。

每張問卷都將視為重要的文件而且不會報導個人回答情形。在這調查結束之後，問卷將被銷毀。大概要花上20分鐘左右來完成這份問卷。請在6月15日以前，用附上的回郵信封寄回本問卷。

如果您想知道本次調查的結果，請填妥附上的索取結果函。在調查結果出來時，一定會寄給您。

衷心感謝您的協助。

輪機工程系主任 謝芒　　船訓中心總幹事



APPENDIX F

REQUEST FORMS

Request for the Result of the Survey

For a copy of the results of this study, please write your mailing address below and return it with the questionnaire.

Name: _____

E-mail: _____

Or

Address: _____

City _____ State _____ Zip _____

調查結果索取表

要想知道此調查結果，請寫下您的大名、回郵地址或電子郵件帳號，連同回郵信封寄回。

姓　　名：_____

地　　址：_____

或

電子郵件帳號：_____

APPENDIX G

ADDITIONAL COMMENT SHEETS

Additional Comments for Each Part May Be Made on This Sheet.

Part I: Instructor's Perspectives on Educational Technology

Part II: Attitudes Regarding Web-based Distance Education

Part III: Perceptions of Web-based International Education Programs

Part IV: Skills with Computers, WWW, and WCM Tools Related to Design, Development, and Delivery of Web-based Courses

Part V. Training Programs for Faculty to Deliver Courses Online

意見表

如果您對上述五大部分有其他意見或評語，請寫在本頁以下空白處。

第一部份：教師對教育科技的看法。

_____

第二部份：教師對網路遠距教學的態度。

_____

第三部份：教師對網路國際教育的見解。

_____

第四部份：教師使用電腦、全球資訊網和網路教學軟體去設計發展和授課的技巧。

_____

第五部份：網路授課培訓課程。

_____

APPENDIX H

DIMENSIONS OF EACH PART OF THE QUESTIONNAIRE

Dimensions in Part I of the Questionnaire

Part I of the questionnaire is the instructor's perspectives on educational technology. It has ten items. They were categorized as three dimensions (F1A, F1B, & F1C) in order to analyze their differences and similarities. The titles of each dimension on Part I of the questionnaire were listed.

The Titles of Dimensions	Items in Part I of the Questionnaire
Making good use of educational technology to improve students learning attitudes and results	F1A: 06, 09, 10
Curriculum design	F1B: 04, 05, 07, 08
Using educational technology to organize and share information effectively and conveniently	F1C: 01,02, 03

The Contents of Each Dimension:

Dimensions	The Contents of Dimensions
F1A	06: Educational technology used in the classroom can facilitate learning activities. 09: Educational technology can reduce stress for teachers. 10. Educational technology can cause learners to become more autonomous.
F1B	04. Educational technology can be combined with traditional methods of instruction. 05. Educational technology can make instructional design more flexible. 07. Educational technology can be used efficiently to assess students' learning. 08. Incorporating educational technology into teaching is time-consuming.
F1C	01. Educational technology is changing too rapidly for me to stay abreast of it. 02. Educational technology can allow information to be shared effectively. 03. Educational technology can be used to organize knowledge.

Dimensions in Part II of the Questionnaire

Part II of the questionnaire is about attitudes regarding Web-based distance education. It has ten items. They were categorized as four dimensions (F2A, F2B, F2C, & F2D) in order to analyze their differences and similarities. The titles of each item on Part II of the questionnaire were listed.

The Titles of Dimensions	Items in Part II of the Questionnaire
Faculty's attitudes regarding teaching by the Web	F2A: 11,12,13,15,17
The ways to encourage faculty members to offer Web-based courses	F2B: 18,19,20
Copyright	F2C: 14
Getting educational degree	F2D: 16

The Contents of Each Dimension:

Dimensions	The Contents of Dimensions
F2A	11. Web-based distance education has a positive impact on education. 12. Web-based distance education is an effective educational tool. 13. Assessment of learner performance in Web-based instruction is time-consuming. 15. Traditional classroom instruction rather than Web-based is preferred. 17. New forms of teaching prohibit me from offering online courses.
F2B	18. Additional compensation for teaching a distance class is required. 19. Additional time to prepare for distance learning classes is important. 20. Support-staff assistance to prepare for distance learning classes is needed.
F2C	14. Losing my intellectual property rights on the Internet is a concern.
F2D	16. Web-based distance education is an option for earning academic degrees.

Dimensions in Part III of the Questionnaire

Part III of the questionnaire is perceptions of Web-based international education programs. It has the ten items. They were categorized as three dimensions (F3A, F3B, & F3C) in order to analyze their differences and similarities. The titles of each item on Part III of the questionnaire were listed.

The Titles of Dimensions	Items in Part III of the Questionnaire
Web-based distance education can break national borders and students and faculty can work together	F3A: 21,22,26,27, 28, 29
The obstacles that made the distribution of Web-based distance education difficult	F3B: 23,24,25
The impact of Web-based distance education to faculty members	F3C: 30

The Contents of Each Dimension:

Dimensions	The Contents of Dimensions
F3A	21. The concept of global interdependence can be deepened via Web-based international education. 22. WWW technology makes it possible for faculty across national borders to participate in course development. 26. The idea of utilizing foreign educational services without leaving home appeals to me. 27. Web-based international education brings new meaning to the term "exchange students". 28. Web-based international education can inspire student interaction across national borders. 29. Web-based international education can inspire faculty interaction across national borders.
F3B	23. Language obstacles are a concern in Web-based international education. 24. Cultural differences concern me in education across national borders. 25. Cultural imperialism is a problem in education across national borders.
F3C	30. Many faculty jobs will disappear as recognized experts offer courses to thousands of students on line.

Dimensions in Part IV of the Questionnaire

Part IV of the questionnaire is about skills with computers, the Internet, the Web, and the WCM tools related to delivering courses online. It has ten items. They were categorized as three dimensions (F4A, F4B, & F4C) in order to analyze their differences and similarities. The titles of each dimension on Part IV of the questionnaire were listed.

The Titles of Dimensions	Items in Part IV of the Questionnaire
Computer basic skills	F4A: 31,32,38
Network skills	F4B: 33,34,35,36,37
Application in offering courses online	F4C: 39,40

The Contents of Each Dimension:

Dimensions	The Contents of Dimensions
F4A	31. Understanding the basic concepts of computer hardware (e.g. CPUs, keyboard) is not difficult for me. 32. Understanding the basic concepts of computer software (e.g. system software, application software) is not difficult for me. 38. The skills of Web-page design using HTML (Hypertext Markup Language) are not difficult for me.
F4B	33. Installing software is not difficult for me. 34. The use of Web Browsers (e.g. Netscape, Internet Explorer) is not difficult for me. 35. The use of plug-in software (e.g. Real Player, Adobe Acrobat Reader) is not difficult for me. 36. The use of search engines (e.g. Yahoo, Google) is not difficult for me. 37. The use of on-line applications (e.g. e-mail, file attachment, electronic discussion groups, teleconferencing tools) is not difficult for me.
F4C	39. The procedures of how courses are conducted on line are not difficult for me. 40. The use of WCM tools (e.g. WebCT, Blackboard, Top Class, or Convene) to deliver courses online is not difficult for me.

APPENDIX I

RESULT OF K-S TEST OF ITEMS 44-48: CONTENTS OF A TRAINING PROGRAM

Result of Two-Sample Kolmogorov-Smirnov Test of Items 44-48

Items	Groups	A	P	N	Z	α
44	1:2	.03	.03	-.01	.26	1.00
	1:3	.07	.07	.00	.75	.62
	1:4	.04	.04	-.01	.40	.99
	2:3	.06	.00	-.06	.44	.98
	2:4	.06	.02	-.06	.40	.99
	3:4	.05	.00	-.05	.40	.99
45	1:2	.05	.00	-.05	.46	.98
	1:3	.01	.00	-.01	.17	1.00
	1:4	.04	.04	-.04	.38	.99
	2:3	.04	.00	-.04	.31	1.00
	2:4	.04	.00	-.04	.29	1.00
	3:4	.02	.00	-.02	.17	1.00
46	1:2	.03	.00	-.03	.25	1.00
	1:3	.00	.00	-.00	.05	1.00
	1:4	.04	.00	-.04	.34	1.00
	2:3	.04	.00	-.04	.26	1.00
	2:4	.02	.01	-.02	.15	1.00
	3:4	.04	.00	-.04	.26	1.00
47	1:2	.03	.01	-.03	.29	1.00
	1:3	.03	.00	-.03	.36	.99
	1:4	.01	.01	.00	.13	1.00
	2:3	.04	.04	-.01	.36	.99
	2:4	.04	.00	-.04	.31	1.00
	3:4	.04	.04	.31	.37	.99
48	1:2	.18	.00	-.18	1.22	.10
	1:3	.10	.00	-.10	.84	.47
	1:4	.11	.00	-.11	.11	.43
	2:3	.12	.02	-.12	.70	.69
	2:4	.12	.07	-.12	.71	.68

Note. Groups: 1 = Voc High, 2 = College, 3 = NKIMT, 4 = NTOU; A = Absolute, P = Positive, N = Negative, Z = K-S, α = Significant Level at .05